ACCS

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MODERN TRANSPORT

"THE TIMES" OF THE TRANSPORT WORLD

DETAILS OF CHANNEL BRIDGE PROPOSAL

See Page 3

VOL. LXXXIII No. 2135 [*Registered at the G.P.O. as a newspaper*] LONDON, APRIL 16, 1960 PRICE ONE SHILLING

CURRENT TOPICS

Diesel Engineers and Users

WITH Mr. James Calderwood, president, in the chair, the luncheon of the Diesel Engineers and Users Association, held on Thursday of last week, was a very happy affair. Mr. Julian Tritton, hon. secretary, and president of the International Federation of Consulting Engineers, proposed "The Guests." The association's spirit of camaraderie in a common cause had its origin in discussion of mutual problems over a glass of beer in a pub; he hoped the guests would enjoy discussion under that day's conditions. In responding, and also proposing the wellbeing of the D.E.U.A., Viscount Bruce of Melbourne said that what engineers and scientists did seemed incredibly clever to him. Despite opposition, when he was Prime Minister of Australia he had been able to bring them to the aid of industry through the Council for Industrial and Scientific Research and eventually it became the best thing that had happened to Australia. He hoped the association would prosper in its task of linking designers, producers and users in a common knowledge of all the requirements. Mr. Calderwood, who replied, said that in the early days of the association it comprised only users of heavy plant; some years ago the makers' side was introduced and he had the honour to be the first president from the other side of the table. Now they would like to see many more of the "portable" users represented, in view of the increase in the use of diesel engines in farming, contracting, automotive and railway traction applications. They could profitably be members and aid their practical discussions of problems and their solutions.

Tasmanian Industrial Mission

INDUSTRIALISTS in Britain are being urged to investigate the possibilities of investing in Tasmania, the delightful island state of Australia which calls itself "This Other England." It is a country rich in mineral resources and through its mountainous nature it has abundant hydro-electric power; output from this source is put at 2,680 million kW in 1960. Although the railway does not play quite the part it did in Tasmanian transport, it is lively in administration; ports are good and the road system is reasonable. In a measure the roads are now merely an extension of the highways on the Australian mainland since the introduction of roll-on-roll-off ships to and from Melbourne. Last week the Hon. R. F. Fagan, Deputy Premier, Attorney-General and Minister for Industrial Development, who is leading an industrial mission to Britain and Europe, expounded the generous terms which greet new industries and the way key staff can be housed with official assistance. The mission was visiting Sheffield and Birmingham among industrial centres and also going to Exeter Cathedral to present a tablet in memory of Lieut.-Col. David Collins, founder of Hobart, and Montrose, the birthplace of Lieut.-Col. Paterson, founder of Launceston.

Electric Traction in South Africa

AN order valued at about £2¾ million has been placed with Associated Electrical Industries for traction motors, control gear and lighting and heating equipment for installation in 113 motor coaches to be built for South African Railways by Union Carriage and Wagon Co. (Pty.), Limited. Most of the A.E.I. equipment will be manufactured in Manchester and Sheffield, but the lighting equipment will be supplied by the Hereford factory of A.E.I. Lamp and Lighting Company. The 3,000-volt d.c. motor coaches will supplement and extend existing suburban and interurban services on the Cape Western and Reef sections. They will multiple with the 105 coaches supplied to the Reef during 1957-59; these had similar A.E.I. equipment, to which only minor changes will be made. The Reef coaches operate at an altitude of 6,000 ft., and to ensure adequate cooling of the motors they are not only self-ventilated but are also fitted with axial-blow fans to provide additional cooling under heavy load conditions. Motors and motor-generator sets will be insulated for Class H temperature rises, and the additional ventilation will be of great benefit both in the operation of the motors and in ensuring long life of the insulation. High-voltage switchgear is located in a pressurised cubicle in the body of each coach. Filtered air is blown into the cubicle; this effectively excludes dirt and dust, giving greatly increased periods between overhauls. The cubicle can be removed through the side of the coach. Another interesting feature is the electro-vacuum brakes. Compressed air is used only for control purposes and for door operation.

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To Further Transport Research

THE announcement, recorded elsewhere in this issue, that the trustees of the Rees Jeffreys Road Fund are establishing a Rees Jeffreys Research Fellowship in Transport at the London School of Economics is particularly welcome in that it must strengthen substantially the ability of the school to foster the study of transport, particularly from the viewpoint of economics, administration, organisation and regulation. It has long been a matter for dissatisfaction that an industry which plays so important a part in the life of the nation should have few opportunities for university study of its many facets. Now with the Institute of Transport's instigation of the developments at Oxford and this latest addition to the resources of the L.S.E., the situation is greatly improved, although there is still room for further expansion in the field if the industry is to attain the stature which it merits. Careful provision is of course made to see that the research work involved will not be hampered in any way and it may perhaps be permissible to wish the holders of the appointment good fortune, for the industry has a singularly large number of unfruitful patches when it comes to seeking information especially as regards the past.

Unique Swedish Locomotive

UNIQUE features in the design of power unit, transmission system and bogies of a new 1,500-h.p. diesel locomotive demonstrated in Sweden last week to eminent railwaymen from various European countries by the builder, Aktiebolaget Motala Verkstad, are worthy of close study. The Motala design is described as a diesel pneumatic turbine locomotive, but this does not fully indicate its greatest departure from orthodoxy—the transmission system—which in fact comprises an exhaust gas-air turbine and an automatic three-step mechanical gear operating differentially in parallel. The design arranges for the turbine to transmit the greater part of the power at the high-torque end of each of the three speed ranges provided by the mechanical gears, giving smooth shock-free take-up and gearchanging and high torque multiplication, and for the appropriate mechanical gear to carry the greater share of the work at the low-load high-speed end of each range, thus greatly improving overall efficiency. Unlike other pneumatic turbine-driven locomotives—such as the French S.N.C.F. 1,000-h.p. free-piston unit and the Swedish Göteverke experimental shunting engine—the Motala Verkstad design uses a well-proved conventional four-stroke diesel engine, which is built under licence to French S.E.M.T. design, working at only moderate cylinder pressures. Part of the engine output is taken normally off the engine crankshaft to drive a centrifugal compressor and, through the mechanical gearbox and a differential gear, to the driving shafts; part is delivered as exhaust gas to help drive the turbine. As well as providing engine charge air at about 34 lb. sq. in. (2.3 to 1), the compressor also delivers air at the same pressure to the turbine, where it is expanded with the exhaust gases.

Afterburning Power Boost

THIS feature of expanding pure air in the turbine is utilised in the design to obtain boosted power when required, thus improving the operational flexibility of the locomotive. A combustion chamber is incorporated in the turbine air intake in which additional fuel can be burned, providing a 20 per cent increase over the maximum output of the diesel engine. Thus, while the V-form 12-cylinder engine is rated at 1,200 h.p., an additional 240 h.p. is available with afterburning, which in the present locomotive is controlled manually by the driver at will. This gives a total disposable horsepower of 1,440 and the difference of 60 h.p. between this figure and the rating of 1,500 h.p. lies in the manufacturer's claim of the superior overall efficiency of the design, which in fact, it is said, provides power at the wheel rims equivalent to that of contemporary diesel-electric or diesel-hydraulic locomotives rated at 1,550 h.p. The locomotive demonstrated last week, which has already completed two months of initial trials, including dynamometer car tests, with Swedish State Railways and is now entering a two-year period of experimental service in various roles with that operator, is the second built by A.B. Motala Verkstad to employ the same general power-transmission system. The prototype, with a 1,060-h.p. diesel engine and a 1-D-1 wheel arrangement, was completed in 1954 and has covered about 250,000 miles in regular mixed-traffic service with Swedish State Railways on the Stockholm—Nynäs line in five years. Its entirely satisfactory operation has encouraged development of the second locomotive, which has a BB wheel arrangement, with coupled axles, on bogies of a new design. A detailed description will appear in a future issue.

The Silver Arrow

THE combination since June of last year of the Kent Coast electric trains of the Southern Region with the Handley Page Hermes of Silver City Airways and the diesel railcar set of French Railways has resulted in considerable development of traffic by the Silver Arrow service between London and Paris. As is by now well known, the cost is comparable with that by second-class rail and boat and there is no doubt that the extra individual attention received by passengers on the Silver Arrow route is greatly appreciated. To call further attention to this facility Silver City has sponsored, with the support of the Southern Region and French Railways, a 15-minute film in colour entitled *The Silver Arrow Story*. The "story" is, in fact, quite simple and designed to stress the ease of the journey by showing how an unescorted adolescent girl made it. This provides the peg for some nice colour shots of both London and Paris and also of trains in transit and aircraft taking off. We were not sure that a few more interior views of the Hermes, which is quite a sizeable aeroplane, could not have been included, but Stanley Schofield Productions has made a workmanlike job of a film which is available on loan from Silver City Airways, the B.T.C. Film Library, and French Railways and which shows effectively how several media of public transport can perform a combined operation.

Margam Marshalling Yard

NO more highly mechanised yard than Margam, Western Region, exists in Europe. That is a claim Mr. R. F. Hanks, chairman of the Western Area Board, who presided over the formal opening ceremony on Monday of this week, could make with pride. Mr. K. W. C. Grand opened the yard on behalf of Sir Brian Robertson, chairman of the British Transport Commission, who was indisposed; he pointed out the great contribution it would make to the modernisation of Western Region freight facilities, in conjunction with other new yards at Gloucester and Shrewsbury Walcot, and improvement of those older yards which were to be retained. Margam yard, with 50 sorting sidings, is adjacent to the rapidly expanding works of the Steel Company of Wales and also serves the industrial area around Port Talbot. It is a fully automatic yard; the humping engine driver is in telephonic communication with the control tower and also receives a reproduction of the humping signal in his cab. The cut card is made up on punched tape from a teleprinter record, the cuts being advised to the control tower by walkie-talkie radio. Point setting is carried out automatically by the tape reader apparatus in conjunction with track circuits. Radar and electronic computers control wagon speed.

Automatic Assessment

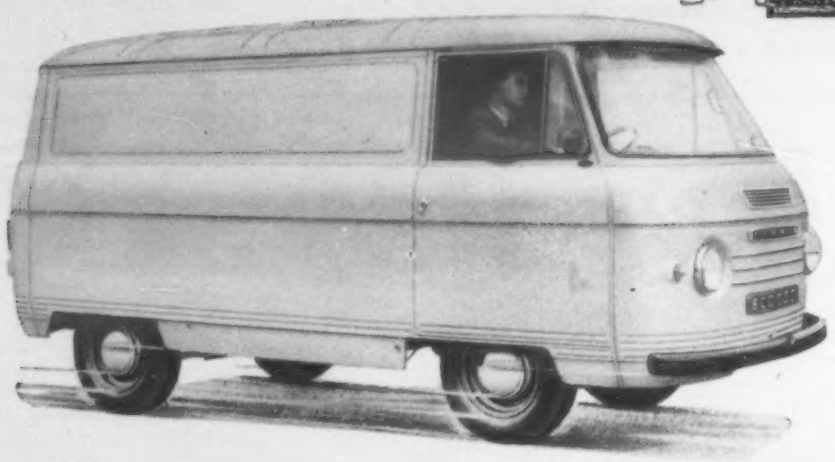
THE rollability of each cut of wagons as it descends from the hump is assessed by computer; a weight detector, comprising micro-switches in a length of slotted rail, provides another factor to be taken into account in selecting the pressure the apparatus applies to the primary retarders. The secondary retarders are governed similarly but a distance-to-run factor enters the calculation at that stage; it is controlled by a potentiometer from track circuits in each sorting siding and estimates how far down the ordained siding the cut can be allowed to run before colliding with wagons already standing there. Resistance on points and through the curves to reach the balloons of sidings is taken into account. The entire apparatus can be operated by the control-tower staff in emergency. There are 216 100-watt floodlights for night work, mounted on 99 tubular towers at a height of 55 ft. Further particulars will be given of these remarkable developments in marshalling yard technique, which reflect great credit on the departments concerned, later.

READ ALL ABOUT IT!

What the critics say:

'The most versatile vehicle of its kind Britain has ever seen'

COURTENAY EDWARDS *in the* 'DAILY MAIL'



"The petrol-engined van possessed a lively performance with a fuel consumption rate of 28.4 m.p.g. at an average speed of 29.2 m.p.h. Fifty-six miles of the M1 motorway were covered at an average speed of 52.4 m.p.h." **Commercial Motor**

"The driving position is excellent, with a field of vision it would be difficult to improve upon". **Daily Mail**

"The handling characteristics and stability of the laden vehicle were certainly faultless on all types of road". **Modern Transport**

"What will appeal most to the tradesman is that smart looks and up-to-210 cubic feet capacity are allied to 30 miles-to-the-gallon economy from the petrol-engined versions and around 40 m.p.g. from the diesel units". **Evening Standard**

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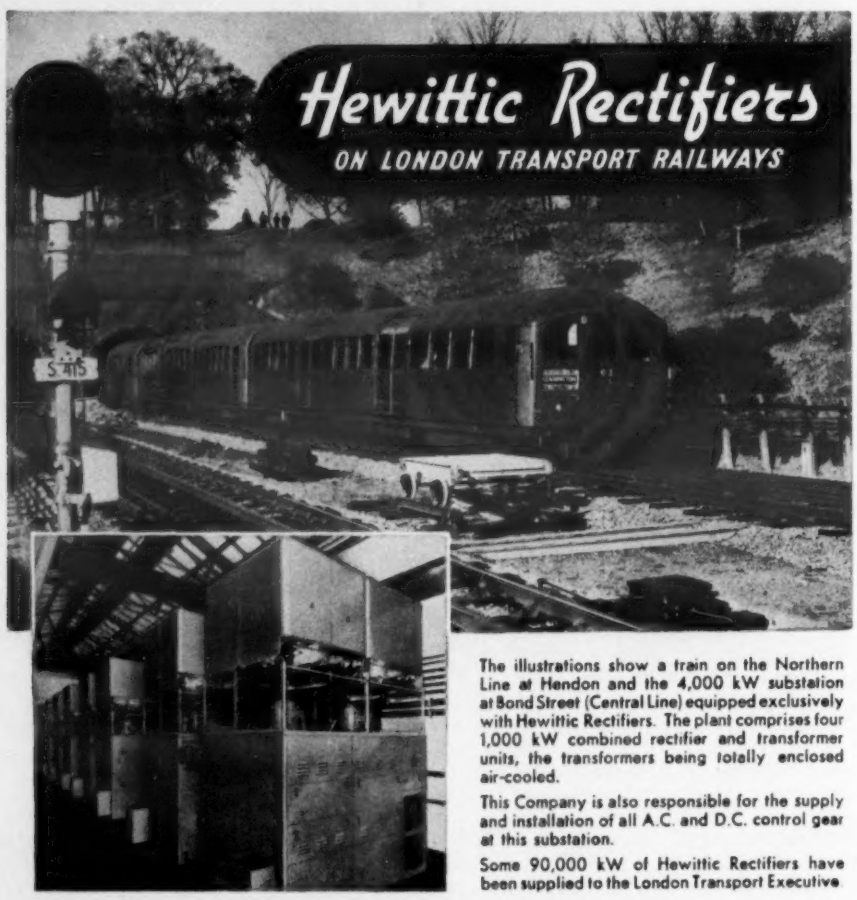
ON LONDON TRANSPORT RAILWAYS



The illustrations show a train on the Northern Line at Hendon and the 4,000 kW substation at Bond Street (Central Line) equipped exclusively with Hewittic Rectifiers. The plant comprises four 1,000 kW combined rectifier and transformer units, the transformers being totally enclosed air-cooled.

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The Editor is prepared to consider contributions offered for publication in MODERN TRANSPORT, but intending contributors should first study the length and style of articles appearing in the paper and satisfy themselves that the topic with which they propose to deal is relevant to editorial requirements. In controversial subjects relating to all aspects of transport and traffic this newspaper offers a platform for independent comment and debate.

The Inquisitors

TRANSPORT in this country since the war has been bedevilled by repeated governmental implementation of Party policies with little or no regard to the views of those experienced in, and responsible for, its administration. It would be no exaggeration to say that this great industry has suffered more than any other in this respect. Indeed, the British Transport Commission was impelled, in its report for 1956, to express the hope that it would be "allowed reasonable freedom and a period of stability to press on with reconstruction"; it urged that no longer should the whole fabric of public transport be "subjected to periodic and seismic upheaval on political account." Due to circumstances over which it had no control, but concerning which it uttered a warning in its re-appraisal statement of a year ago, the Commission recently reached a stage in which further financial assistance became necessary. In this situation the Government saw justification for yet further action. It decided to appoint an advisory planning board, membership of which the Minister of Transport announced in the House of Commons on April 6. Apprehension about its constitution had been somewhat allayed by assurances given in the House on March 23 by Mr. John Hay, Joint Parliamentary Secretary to the Ministry. These included a promise that the Commission would be represented because, he said, it possessed much of the information upon which the planning board would base its conclusions. No such representation is now intended. Questioned about this omission, and also about the lack of T.U.C. representation on the board, Mr. Marples replied that after much thought it had been so decided because both Commission and unions "could best put their views that way, without inhibitions."

Vital Factors Ignored

THIS may be so, but the decision ignores two vital factors: first, the complexities of the railway industry, which can be appreciated only by those experienced in it, and, secondly, the doubts and mistrust which will be engendered in the minds of those who work on the railways. As we have explained on a previous occasion, there is no cause to suspect mismanagement by the Commission, and certainly not to the extent of putting it in the dock; rather has it been the victim of circumstances. But whilst, as Mr. Marples suggested, it might be "ill-advised for people to be judges in their own cause" the Commission is at least entitled to participate in the inquiry, if only in the role of assessor, and we know of at least one man, retired from active service, who has unparalleled knowledge of transport and who could be relied upon to give objective and impartial advice. A representative of the Ministry of Transport is to be appointed to the board, and it might be argued that he will safeguard the Commission's interests; but can one be sure that a civil servant, with perhaps ephemeral occupation of a particular ministerial post, has the knowledge and experience to guide the four inquisitors in the intricacies of railway methods and administration, eminent though they undoubtedly are in the realms of industry and commerce? Then, as regards trade union representation, it has become the practice in Government inquiries of this nature to include a member of the T.U.C. Without him the inquiry becomes suspect as representative of big business, and in this instance of Tory policy; "industrial tycoons" was the phrase used by Mr. Shinwell, who could hardly have been reassured by Mr. Marples's remark that "the one thing which will ruin any reorganisation is if it were to become a party political matter."

Question of Representation

IF, as the Minister suggested, it were an embarrassment to a trade unionist or a member of the Commission to sit on this body as members, why should they not do so as guides, or assessors? That would, as Lord Swinton urged in the Lords, at least give the recommendations a greater chance of acceptance by both Commission and unions, whose good will was necessary to put them into effect. The Minister was talking rubbish when he suggested that because one of the members of the board gave transport much business the four had "great experience of transport." However, he emphasised that they were not necessarily giving expert advice but would be considering expert advice given to them. They would be in close touch with the Commission and the unions, all of whom could make whatever representations they wished; the board indeed could make any recommendations they liked. As we see it, few railways in the world today are able to avoid deficits—few run without State aid—and the Commission's evidence might even convince the board of the wisdom of leaving things as they are, but with necessary modifications which the Commission itself might be prepared to suggest. Moreover, the board might well recommend removal of the remaining restrictions which hinder the railways from being run as a commercial enterprise. In this connection its chairman, Sir Ivan Stedeford, concerning whom a biographical note appears on page 9, has not in the past been averse to the exercise of authority from the centre to a degree unsurpassed even by the Commission.

Scope of the Inquiry

IN emphasising that the board would be purely advisory, Mr. Marples said its terms of reference were extremely wide; they are:

> To examine the structure, finance and working of the organisations at present controlled by the Commission and to advise the Minister of Transport and the B.T.C. as a matter of urgency how effect can best be given to the Government's intentions as indicated in the Prime Minister's statement.

The statement was made on March 10, when Mr. Macmillan announced the Government's acceptance of the objective underlying the Guillebaud report. The industry, he said, must be of a size and pattern suited to modern conditions and prospects. The railway system must be remodelled to meet current needs and the modernisation plan must be adapted to this new shape. The public would have to suffer certain sacrifices of convenience in the reduction of uneconomic services and some increases in fares and rates. The Commission must accept a radical alteration of its structure so as to secure a more effective distribution of functions and the better use of all its assets; and reorganisation should include decentralisation of management so that individual undertakings, including the railway regions, should as far as practicable be made fully self-accounting and responsible for the management of their own affairs. Concerning these proposals, which were critically examined in our March 19 issue, we need only comment here that the principle of decentralisation (Cmd. 9191) was duly implemented by the Commission five years ago, since when the organisation has been under constant process of adjustment and improvement; further, that regional accounting in the manner proposed would necessitate resurrection of the Railway Clearing House and inter-regional numbertaking, an expense and inconvenience with which the railways were able to dispense on nationalisation. We have not, of course, heard the last about this planning board, as the Opposition, angered by the Minister's statement, is to move a formal motion asking for a reduction of his salary; this is being debated as we write.

NEWS SUMMARY

LAST of the trolleybuses in East and North East London will operate on April 26; from the following day West Ham and Walthamstow garages will operate Routemaster A.E.C. buses only, 100 being added to the fleet. Trolleybus routes concerned are 623, 625, 687, 697 and 699, covering 23 miles of road; including the previous five stages trolleybuses have been withdrawn from 92 route-miles. As before, route improvements have been effected, including a new Woodford Green—Woodford Bridge connection and strengthening of Tottenham—Leyton—Stratford links.

The last scheduled flight for B.O.A.C. by an Argonaut (Canadair DC4M1) was completed on April 8. The 22 of this type operated by the corporation flew nearly 107 million miles and carried 870,000 passengers.

The Air League of the British Empire has published a second report by its air transport committee. This presses strongly for Government support for development of a transport aircraft to cruise at Mach 3 (1,700 knots), a V.T.O.L. aircraft for stages up to 750 miles and the urgency of automatic air traffic control.

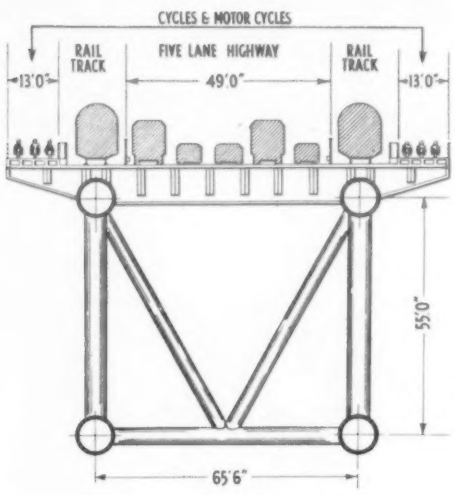
Derby Aviation, B.K.S. Air Transport, East Anglian, Cambrian, Jersey Airlines, and Starways may provide joint internal services.

CHANNEL BRIDGE SCHEME

Dorman Long Backs Proposal

MANY ADVANTAGES CLAIMED

LAST week brief reference was made to the proposals of an international consortium which includes Dorman Long (Bridge and Engineering), Limited, for the construction of a bridge across the English Channel. The promoters, all concerned with world-renowned engineering projects, consider the scheme eminently practicable and adduce a series of advantages over the tunnel. Their suggestions have been submitted to the International Channel Tunnel Study Group. The case for the Channel bridge is outlined in the following notes.



Typical cross section of bridge

Tunnel Costs Less

Solely from the point of view of the lowest first cost, a railway tunnel solution may be favoured. At the best this can only provide for the transport of motor vehicles by rail, with all the drawbacks of intermittent operation and delays in loading which this involves. A tunnel to accommodate two railway tracks was the solution of the problem propounded in 1875. A vehicular tunnel, through which cars can be driven, is a better but very much more expensive solution. There are, moreover, inevitable hazards in the construction and operation of vehicular tunnels of such great length and size, particularly where the gradient from the access to the tunnel is downwards at both ends. The length of such a vehicular tunnel under the Channel could not be less than 25 miles. The cost of operating and ventilating such a tunnel would inevitably be high. If provision for railway tracks also were to be made in the tunnel, the cost would again be greatly increased and the tunnel would have to be lengthened to allow for easier grades.

Bridge For All Traffic

From the general, technical and economic viewpoint a tunnel-type of crossing provides only a partial solution to the problem already outdated by the present trends of traffic development and doomed to increasing inadequacy as these trends develop further in the future. An endeavour to adjust such a solution to the requirements of modern and future traffic must lead only to unacceptable hazards to the users. The only solution of the Channel crossing problem which can provide a direct connection between England and France suited to all types of traffic, both road and rail, without interruption and in accord with the requirements of the second half of the twentieth century, is a bridge, it is claimed.

A project and priced estimate for such a Channel bridge, prepared under the direction of the Compagnie Française d'Entreprises, has been submitted to the Channel Tunnel Study Group on behalf of that company, in association with Dorman Long (Bridge and Engineering), Limited, and Merritt-Chapman and Scott Corporation of America. A feature of the project is the use throughout of large standardised elements for both the superstructure and substructure. This type of design facilitates the use of very large and powerful units of construction at all stages, ensuring maximum economy and safety. The three firms, with an unrivalled experience of the construction of major bridges, have complete confidence in its feasibility.

Advantages of Bridge

Advantages claimed are:

1. From the aspect of amenity a bridge has every advantage over a tunnel. An underground journey of 25 miles is not a subject for pleasant anticipation.
2. The bridge solution obviously provides the greatest safety to its users. The hazards of fire or ventilation failure are inherent in all long tunnels and become of major significance in a tunnel 25 miles long, sloping downwards at both ends.
3. Road and rail and cycle traffic of all kinds can be accommodated on a bridge structure without any interruption or check to the flow of traffic.
4. Steam, diesel or electric means of propulsion can be used for the railway traffic.
5. The largest vehicles which can be accommodated on the roads of either country may pass freely on the bridge.
6. No interruption or re-handling of goods or passenger traffic is involved beyond that enforced for police or customs purposes.
7. Terminal installations can be reduced merely to the requirements for toll collection and customs facilities.
8. The work involved in bridge construction can be most widely divided among many firms and interests, whereas that of a bored tunnel is concentrated upon the few workers who can operate at the tunnel faces.
9. The first cost of a bridge cannot be simply compared with that for a tunnel. The true comparison lies between the unit cost per ton, per passenger, car or vehicle crossing the channel, with proper allowance for future developments with either solution after taking due account of the cost of maintenance.
10. Since the financing of the project is inevitably subject to the guarantees of the British and French Governments, it would seem that its benefits should be as widely distributed as possible and not confined to the users of rail traffic only to the detriment of commercial and private road users.
11. Only an open uninterrupted highway can permit the full development of tourist and commercial traffic between England and Continental Europe through France.

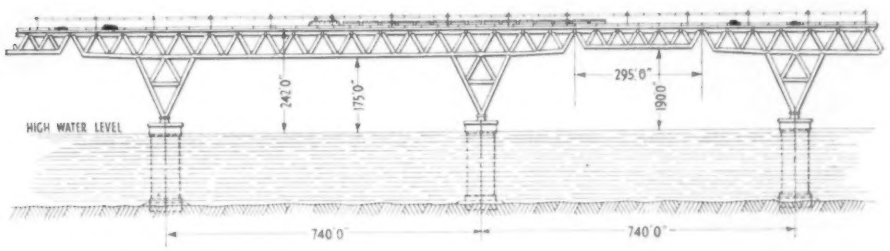
For Modern Traffic Needs

It is claimed by bridge advocates that the terminal interchange facilities and installations at the end of a tunnel, with all their staff amenity, parking and equipment requirements, must be provided for peak traffic conditions, and will be operated most uneconomically at other times unless long delays are to be tolerated under maximum traffic conditions. On the other hand the five-lane carriageway proposed for the bridge could produce its own dangers. This feature of the London—Brighton motorway scheme of the 1920's was the subject of considerable criticism.

The proposed line of the bridge crosses the Straits of Dover at the narrowest point, a distance of 21 miles from the South Foreland near Dover to a point just south-west of Sangatte near Calais. Rail connection with existing routes can be made within five miles of the bridge terminal on the French side and just over two miles on the English side. Considerable investigations of the foundation conditions on the sea-bed have already been carried out. If subsequent investigations of the route proposed show any diversion to be advisable, this can readily be accommodated. The elevation of the land at both ends of the bridge greatly facilitates the bridge approaches. The bridge terminals in both England and France will lie in open country permitting the development of terminal facilities and connections to existing routes without great cost. The whole design of both substructure and superstructure has been prepared with a view to site construction of the largest possible units with the minimum of delay by standardised mass-production methods and making use of the heaviest equipment.

Rail Tracks and Carriageway

The bridge is designed to provide a central five-lane highway 49 ft. wide; two rail-road tracks, one on each side of the highway located directly over the bridge girders; and an overhanging sidewalk 13 ft. wide on each side for cycle and motor-cycle traffic. The design has been prepared in accordance with British and French national loading standards and specifications. On economic grounds for the conditions prevailing, a span of 740 ft. between pier centres has been adopted throughout the crossing with the exception of two pairs of wider navigation openings, situated on the sea routes on either side of the Varne Bank. A minimum headroom of 170 ft. at high water is available under the ordinary spans and 230 ft. in the navigation openings. The normal spans are of alternate rigid cantilever and suspended span construction.



Elevation of typical section of proposed Channel bridge to join England and France

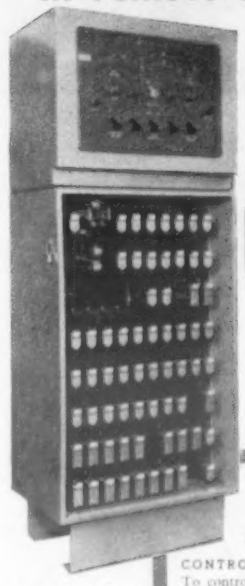
On the proposed bridge location the piers are situated in the following depths of water: 18 in depths between 0 ft. and 65 ft.; 35 in depths between 65 ft. and 100 ft.; 45 in depths between 100 ft. and 130 ft.; and 44 in depths between 130 ft. and 165 ft. Their construction would involve no difficulties greater than those which have already been successfully overcome. The successive construction of a very great number of piers of the same design and in increasing depths of water will permit the development and adjustment of the fabrication and placing technique adopted as the work proceeds towards the deeper water.

Construction of Piers

The piers would be of uniform section, approximately elliptical in form and consist of heavy precast rings of reinforced concrete superimposed on one another, with socket-type joints. The lowest ring, forming the foundation on the channel bed, would be filled with a grouted rockfill mass after setting in place. The remaining rings would be filled with sand or other suitable granular material to provide the required stability. The whole pier would be anchored to its base by cables set in conduits formed in the walls of each ring and grouted in place. The upper ring would be covered with a concrete slab, some 50 ft. above sea-level, upon which the legs of the steel superstructure are supported. The steel superstructure would comprise cantilever truss spans 1,180 ft. long, overhanging the standard 740-ft. openings. Their ends are connected by 295-ft. suspended spans. The depth of the cantilever spans is sharply accentuated over

(*Continued on page* 12)

Greater speed and simplicity in remote signal control



View of Type 'S' Control panel for remotely operating a station on a single line of railway. Front cover has been removed to show relays.

WITH THE

AEI-GRS Type S

remote control system

The Type S remote control system, developed by AEI-GRS, provides a swift, simple and economical means of remote control and indication, using a minimum of apparatus. Designed specifically for remote control of a single location this 'synchronous stepping' code system is based on a unique principle employing the free swings of two mechanical oscillators—one at each end of the circuit—to create the steps of the code.

METHOD OF OPERATION

CONTROL action completed in 1 second

To control a field device, a switch on the control machine is moved to set up the appropriate code in the control office application unit. This code is transferred to the stepper unit and transmitted over the line circuit to the field apparatus. The field stepper unit on receiving the code applies it to the field application unit, which responds to the particular code message and controls the function relay operating the field device. This entire control operation takes approximately one second to complete.

INDICATION given in 2 seconds

When a field device changes position, it notifies the field application unit which automatically starts the stepper unit transmitting the appropriate code back to the control office, where an indication light on the control panel diagram shows the new position of the field device. Indication is completed in about two seconds.

SIMPLEX AND DUPLEX SYSTEMS

Type S remote control system installations of many types can be furnished to meet specific traffic requirements, from a Simplex 7-step system with a capacity of 32 control codes, to a Duplex 11-step system providing a maximum of 1,024 control codes.

Already this AEI-GRS system has proved highly successful in many installations, and over transmission distances of up to 200 miles. As in all coded systems, codes are contained in a series of steps, or intervals. However, with the Type S system the use of mechanical oscillators to create the steps ensures that codes are of uniform length and that stepping speeds are always constant irrespective of normal voltage variations. Conventional signal lines can be employed and provision made for voice or telegraphic communication over the same wires if desired.

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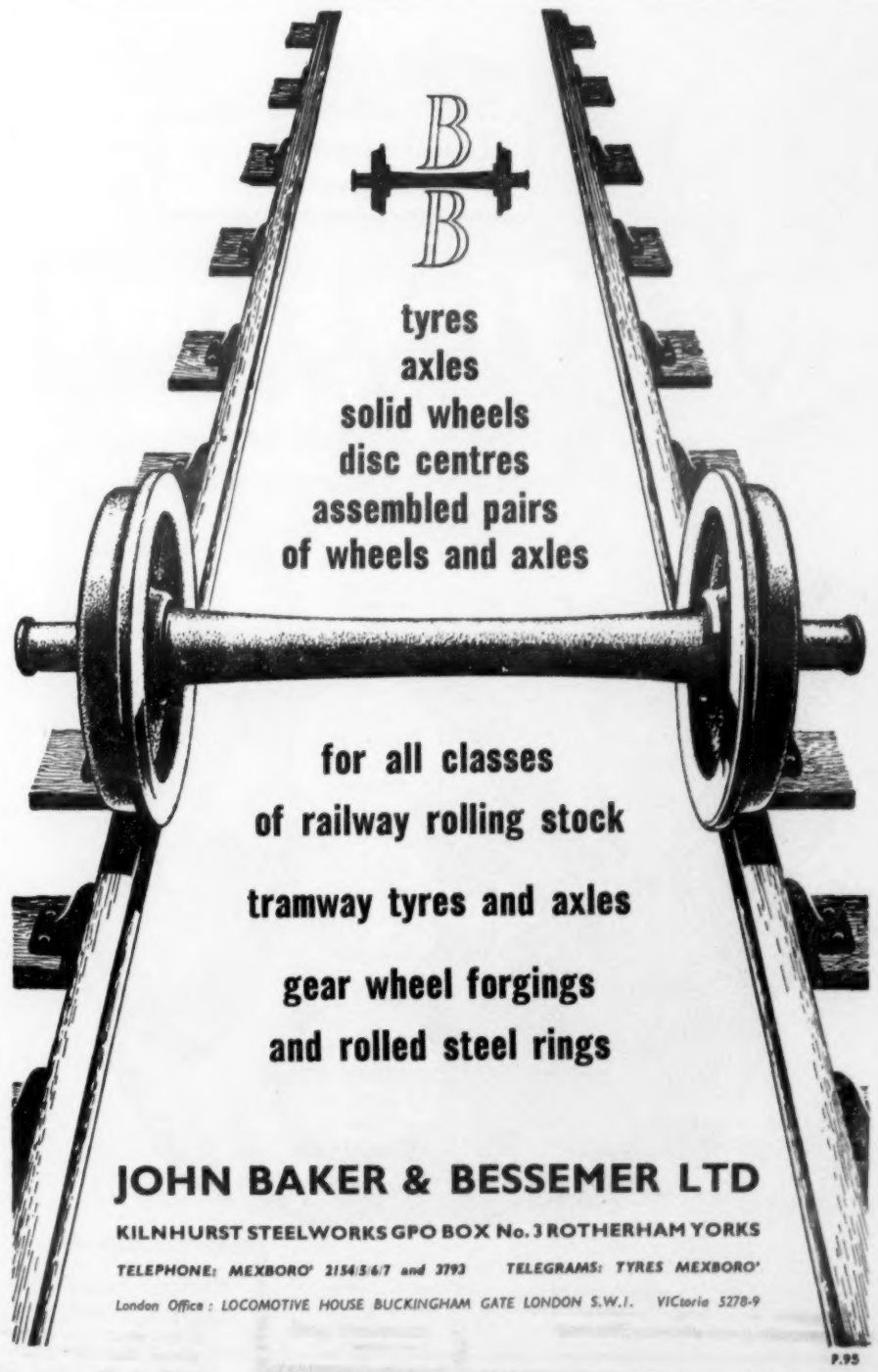

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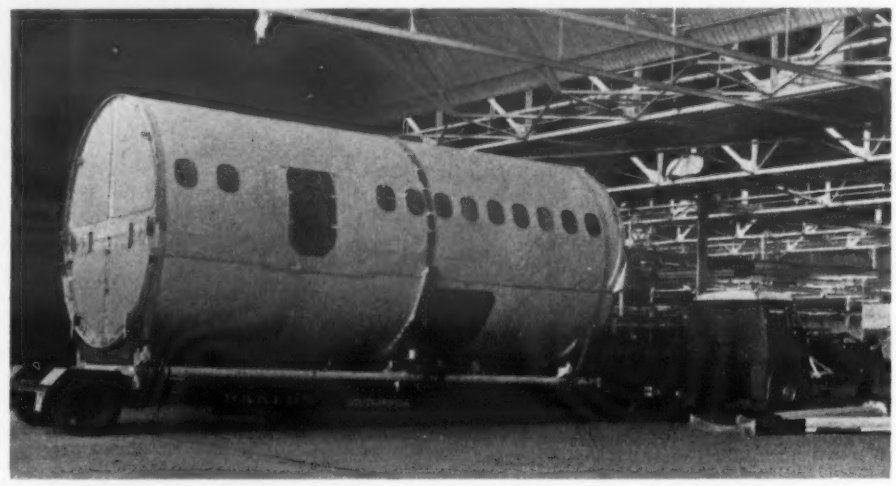
LORRY—BUS—COACH

Glasgow Proposes 3d. for Half-Mile

PROPOSALS for increases in fares to meet a wage bill £377,000 higher following the current award have been put forward by the general manager of Glasgow Corporation Transport Department, Mr. E. R. L. Fitzpayne. It is proposed that instead of one and two stages (up to an average of 1.15 miles) at present given for 3d., 3d. should be charged for the first stage (about ½ mile) and 4d. for the second stage; and the present maximum of 10d. for 10 or more stages (six miles and over) should be amended to 10d. for 10 stages (6.17 miles), 11d. for 11 and 12 stages and 1s. for 13 stages and over. Also recommended is that weekly tickets should be withdrawn from trolleybuses and trams, as only a very small number are sold on these sections and the administrative cost does not justify their continuance. Other suggestions put forward by Mr. Fitzpayne for gaining additional revenue include a review of the attendance bonus scheme which costs £120,000; increasing the charge for each of the 2,000 blind passes from 3 to £7 10s. a year; increasing the 4s. weekly travel tickets for schoolchildren by 1s. 6d. or 2s. 6d.

It is also pointed out that the department has issued 130,000 permits to old-age pensioners at an estimated cost of £220,000 a year, and suggests increasing the cost of fares to aged persons; or increase the age limit and make it available to those who possess either an old-age pension book or a public assistance book; or abolish the permit or alternatively meet the cost from the rate fund. It is considered that, subject to the necessary consent of the Traffic Commissioners, fares should be raised by early June.



A 27-ft. section of the hull of the first Airco DH121 600-m.p.h. short-haul jet air liner arrives at the de Havilland factory at Hatfield from Portsmouth. The E.R.F. articulated low-loader is operated by Bakers Transport (Southampton), Limited

B.R.S. in New Home

IN common with certain other departments of the B.T.C., the whole of the headquarters staff of British Road Services will start moving this weekend to Melbury House, Melbury Terrace, Marylebone, N.W.1. This is a new 11-storey office block behind Marylebone Station. B.R.S. will occupy three or four floors; part of the accommodation is occupied by private firms. The removal was, of course, carried out by B.R.S. (Pickfords), Limited. The telephone number is unchanged—Paddington 1161.

Atlas Express Stars in Film

A LARGE slice of publicity comes the way of Atlas Express Co., Limited, in a 10-minute "short" filmed by the Rank Organisation as one of its admirable series *A Look at Life*. These are potted glimpses into activities which the public takes for granted. A Bedford-Scammell articulated van is seen at the London depot of the carrier and on the M1 motorway. The colour is splendid and the action and commentary are snappy. Emphasis is laid on vehicle safety checks. Featured are an Atlas driver (who runs his own Ford Consul) and Mr. J. T. Brown, London manager. Presumably to preserve some balance, B.R.S. gets a (very) brief look-in. This film, *All Through the Night*, is distributed by Rank Film Distributors, Limited, and will be played at Rank release theatres in North West London next week, and in North East and South London in succeeding weeks.

Ultimatum to Booking Agents

DUNDEE coach operator and travel agent R. Dickson Junior, Limited, is complaining that inspectors from British Railways have been calling on his booking agents asking them to stop selling Dickson tours. In default of this the inspectors, it is alleged, said that the agent's railway licence—which enables the agent to carry a stock of railway tickets, book seats, etc.—would be withdrawn. Mr. Dickson took legal advice and was told there was nothing he could do. The railway inspectors had not told the agents to stop selling Dickson tours. They had offered the agents a choice.

Mr. Dickson decided to write to Sir James Duncan, M.P. for South Angus. He received a reply from Sir Brian Robertson, chairman of the British Transport Commission, who said that the Commission did not wish in any way to impede the firm's business, but that when the Commission appointed railway agents the terms of the agreement precluded their accepting other interests without their consent. He pointed out that Dickson competes directly with British Railways as well as with Scottish Omnibuses services, and the attitude they had taken was simply to safeguard their own interests.

Move Towards 36-ft. Buses

THE Ministry of Transport is going to be urged to increase the maximum permitted length of public service vehicles to 36 ft., says Mr. R. J. Ellery, the B.E.T. executive. Of all European countries (apart from Great Britain), he points out, only the Republics of Eire and Portugal still cling to a lesser maximum. Many Continental countries in fact permit the operation of vehicles of a length greater than 36 ft. An increase in the permitted length in the United Kingdom would enable the industry to increase the number of seats in single-deck vehicles, to improve operating efficiency and, indirectly, place it in a better position to maintain rural services at levels of sufficiency. Another measure, one for which the industry has been pressing for some time, is an increase in the speed limit outside built-up areas. The public service vehicle should be placed in a position of parity with the private car in this respect, he says.

T.D.G. Progress in 1959

WHILE the shadow of nationalisation has largely been removed from the long-distance haulage sphere, competition in this field is keen and the attitude of British Railways, in making "desperate attempts to secure traffic at almost any price, is threatening the profitability of all forms of transport—and especially the invaluable contribution of coastwise shipping and lighterage." These are the views of Mr. P. S. Henman in his annual report with the accounts of Transport Development Group, Limited, for the year 1959. As is already known, the group net profit rose from £231,015 to £363,221. Railway policy, says Mr. Hennan, is at present contrary to all the principles of profitable trading.

During the year acquisitions, apart from the Bristol Industries group, with its 90-vehicle Western Transport fleet and 100-plus fleet of Contract Hire (Car and Commercial Vehicle), Limited, included Connal and Co., Limited, providing warehousing and haulage in Glasgow, with subsidiary haulage and wharfage businesses. Group companies erected modern single-storey warehouses, for mechanical handling, at Birmingham, Hull and Dartford and a North of England distribution centre, with a fleet of contract vehicles, was opened for a national confectionery manufacturer.

Decentralisation in Ceylon Board?

DISCUSSIONS have taken place between the new Ceylon Minister of Nationalised Services, Shipping and Transport, Mr. M. Jayawickreme, his Permanent Secretary and the chairman of the Ceylon Transport Board, Mr. Vere de Mel, with a view to increasing the efficiency of the Ceylon Transport Board. These are aimed in part at the immediate decentralisation of the bus services. The Minister has stated that the nationalised undertakings will continue nationalised and that every step will be taken to improve the services by providing the public with cleaner, faster and regular services.

B.E.T. Wins Big Damages Case

DAMAGES of £45,000 were awarded to the British Electric Traction Co., Limited, in the High Court on Monday this week against Mr. Thomas Edwin Langton, of Piccadilly, London, W.1, for breach of an agreement entered into by him not to operate Continental coach tours for seven years after selling his business, Blue Cars, to the B.E.T. in 1953. B.E.T. then paid £126,000 for coach businesses operated by Langton. It was alleged that the latter developed a new business called Sky Tours which ran Continental tours in competition with B.E.T. companies in 1955-57. Mr. Justice Pearson found that this was wrongful competition. A stay of execution was granted pending a possible appeal.

Effects of Shorter Working Week

WOLVERHAMPTON Transport Committee considering the changed financial position of the undertaking following the recent wage awards and reduced working week for transport employees, estimated to cost approximately £90,000 per annum, says that other increases in costs may be incurred. For example, the reduced working week in industry generally may put up the prices paid for commodities used. Already two national suppliers have increased their prices. This reduced working week in industry locally may also affect the bus services provided. Financially this could be for better or worse, largely dependent upon the degree of staggered hours attained. On the other side of the picture, there is to be considered the impact that increased wages and improved conditions for bus workers could have on recruitment of labour to the bus undertaking, thereby reducing excessive overtime. At the moment recruitment is negligible, indeed the position is worsening.

Bus and Coach Developments

Broadway Coaches (Broadway), Limited, wishes to convert its Broadway—Chipping Campden—Cheltenham route from an express to a stage service.

Sargeant Brothers, Kington, applies for the Kington-Presteigne service of G. D. Bengry.

J. A. Dickson, Stoke Mandeville, seeks excursions and tours from Princes Risborough of Risborough Motors, Limited.

United Counties Omnibus Co., Limited, proposes to revise its local services at Bedford.

Birkenhead Corporation applies for a summer Sunday service, which would operate daily during school holidays, between New Ferry (Depot) and Moreton Shore via New Chester Road, Bedford Drive, Storeton Road, Arrowe Park, Upton Village and Moreton Cross.

THE TRANSPORT SYSTEM

Its Structure and Organisation

*By GILBERT J. PONSONBY, M.A., M.Inst.T.**

ULTIMATELY, the meaning of structure is really the distribution of power and/or responsibility for providing and pricing transport services. In short, who is responsible for what. Two major influences have been at work in building it over the last forty years. First there have been the factors of the market—the spontaneous growth of institutions such as the joint-stock company, the private company, the municipal undertaking, the partnership and the one-man business, in response to public demand as expressed by that public's willingness to pay for services rendered. Second, the influence of the State in shaping and determining the size, control and the degree of monopoly enjoyed by those responsible for providing public services.

In surveying the influence of the State over the period in question one can recognise two distinct periods. The first, lasting up to the general election in the autumn of 1952, and the second since that date. During this first period (1920-52) the influence of the State, reflecting a big majority of public opinion, was all on the side of largeness, "controlled monopoly" and finally centralisation. The process of enforced unification and centralisation, the deliberate creation of degrees of monopoly far in excess of anything that would have emerged without State action reached its peak in the Transport Act of 1947. But as Sir Brian Robertson has nicely put it, that Act "could scarcely be described . . . as an act of sacrilige or revolution. On the contrary, it is much more probable that historians in the future will regard it, party politics nothwithstanding, as a natural sequel to the course of events in the transport world in this country since the first war."

Ultimate in Centralised Control

It is doubtful whether British Transport will ever again be so centralised as during the years immediately following that Act and up to the passing of the Transport Act of 1953. Under the Railway Executive the former four main-line companies had been grouped into a single railway system, whereas British Road Services representing the nationalised sector of long-distance road haulage had over 40,000 vehicles in possession at the end of each of the years 1950, 1951 and 1952. Many road passenger services, canals, docks and harbours had also been brought under the direct control of the B.T.C.

What was the main idea underlying this succession of amalgamations and financial fusions, this persistent drive towards "controlled monopolies" and bigness? The trend drew sustenance from many rivulets of thought. The alleged wastefulness of competition, the economies of scale and ideological considerations no doubt played their part. But in my judgment by far the strongest and most persistent influence was the assumed desirability of a system in which by means of financial unity and bigness one form of transport could support (or be supported by) another form, in which one service could subsidise (or be subsidised by) another service, or in which one traffic could be carried at a high profit so that another traffic could be run at no profit at all and at a loss.

Then came the passing of the Transport Act of 1953. Historically this Act, although slim and small compared with the nationalising Act of 1947, was in my view of greater significance. For it marked a reversal of policies pursued by virtually all political parties for more than thirty years.

Road Haulage

Few branches of transport, or indeed of industry generally, can be said with more truth to have been "the sport of politics" than road haulage. By March, 1920, there was a paltry 100,000 registered goods vehicles on the road. Ten years later that figure had more than trebled. By 1938, nearly twenty years on, that number had risen to 495,000 an almost five-fold increase. After another twenty years the million mark had been passed: in June, 1959, there were no less than 1,308,000 vehicles with carriers' licences in the hands of well over half a million operators.

It was not until after the Road and Rail Traffic Act of 1933, and the introduction of licensing which followed, that we know anything very much about its structure. But at the end of over a decade of growth, freedom of entry, struggle, hard work, some dangerous driving and some failures, during which time, however, road haulage had become successfully integrated into our system of production, distribution and exchange, the position was as follows:

Figure extracted from First Annual Report of the Licensing Authorities, 1934-35

Licence holders	27,096	35,089	149,083
Licences current	28,739	35,279	149,282
Vehicles authorised	100,183	55,558	303,886
Average vehicles per licence ..	3·49	1·57	2·04

Specialised Requirements

The reasons why this structure on the one hand emerged spontaneously, and on the other, apart from the effect of the Transport Act of 1947, has tended to persist and survive to this very day, are not far to see. In general terms many of these services were and still are highly local and special to the requirements of particular places and industries. The requirements of the Potteries, or the special requirements of any country town come to mind. Close personal relationships involving mutual trust and a close awareness of the needs of the customer have been an essential element in the growth of this branch of transport. But even in those branches of the business where cost (and therefore charge) per unit of service, whether per package, sack, ton, ton-mile or, most vital of all, per vehicle-mile, must in the long term be the determining factor, it comes as no surprise that this structure emerged and tends to survive.

For, to get the lowest possible average costs, as in every other branch of transport, the really important requirements are: (i) the "right" sized vehicle—where it is just carrying tonnage, large vehicles rather than small ones; (ii) a high load factor—preferably a load in both directions, and (iii) a high utilisation of capital and manpower, i.e. many hours in traffic and/or a high vehicle-mileage per unit of time (hour, day, week or year).

On all three accounts there is no obvious reason why the small man should not achieve these fundamental economies of operation as a firm with a large fleet. And if it can be proved that under certain other headings of cost such as maintenance—it may pay a large fleet to employ highly mechanised methods of overhaul and maintenance—or the purchase of spares and supplies generally, the large fleet can achieve some real economies not open to the small man, the latter may well make up for this in terms of lower overheads and that better and more personal service which does sometimes result from the tenacity and enthusiasm associated with those who seek financial independence. It seems to me that such considerations not only go some way to explain the past, but are at the very heart of some of our transport problems today.

Then came the licensing provisions of the Road and Rail Traffic Act of 1933, dividing the industry into those holding A, B or C licences. The broad effect of the Act was to virtually stabilise the number of vehicles for which A and B licences were required and over which the licensing authorities had discretion in issuing licences therefor. But the number of vehicles under C licences continued to grow rapidly and has in recent years passed the million mark. As a consequence of the nationalising Transport Act of 1947, by the end of 1952 no less than 3,774 (1 repeat 3,774) separate long distance road haulage undertakings had been swept into what came to be known as British Road Services. This gargantuan operation has no precedent in political or economic history. At the end of 1952 B.R.S. had a stock of no less than 39,320 vehicles available for public service, besides many trailers. Then came the Transport Act of 1953 under which the British Road Services fleet was reduced from near 40,000 to the present figure of 15,000 vehicles only. Thus, in spite of the existence of B.R.S., the industry is for the most part still made up of small businesses.

Buses and Coaches

The history of the development of the omnibus and coach business (outside London) is not unlike that of road haulage, the controlling and stabilising Act in this case being passed in 1930. There were prior to 1930 no less than 2,350 separate licensing authorities in Great Britain alone. Even then some areas were not covered by authorities with licensing powers at all. And in some instances where licences were refused it paid the operator handsomely to pay the highest permissible fine and get on with it. The administrative picture was chaotic indeed.

What, however, was the actual achievement of this period of rapid growth (1920-30)? Briefly, within little more than a decade a great network of omnibus and motor coach services had woven itself into the social and economic fabric of this country, which network in adequacy and popularity can, I think, be truly said to be second to none in any other country in the world. It was not until the appearance of the first annual report of the Traffic Commissioners that we came to know much about the structure of this branch of the public transport industry. In this it transpired that there were on March 31, 1932, no less than 6,434 licensed operators in business. There were indeed outstanding differences within the industry as regards size and shape as is still the case today. But of those 6,434 operators more than half owned either one or two vehicles apiece.

Survival of Small Operators

How is the growth and survival of the small bus and coach operator to be explained? A small bus operator in a country district, although normally providing a link between town and country, will have his garage and such office accommodation as he requires at the village end of his route and thus avoid the higher rents associated with the town. Instead of a lock-up brick-built garage, an open shed will suffice. And as regards any office accommodation required, this will be found either in connection with some other part of the operator's business (car hire or garage), or in his own house. Thus, as is so often the case, instead of overhead costs becoming a greater burden per unit of output (bus-mile) as the firm becomes smaller, some of them virtually disappear altogether.

But it is in connection with labour and labour costs that the small man has the biggest advantage of all. It goes without saying that there are no traffic inspectors. But it is the small man's capacity to employ himself and possibly members of his family for short periods (morning and evening peaks), spending the rest of the day doing some other quite different job (publicans are in the business) that gives the small man the biggest advantage of all in areas where traffic is both light and intermittent. Thus it comes about that many services in rural areas which a large firm cannot work at a profit, committed as it probably is to guaranteed days and weeks and a severely limited number of split-shifts, can nevertheless be made to pay by a small one. The employment of casual labour is another important factor, whether at weekends, or at busy holiday times.

Lest I should appear to have drawn attention only to the advantages of the small man and none of the disadvantages, let me say at once that my purpose has been to explain rather than to justify his growth and survival. On the side of buying fuel, tyres and spare parts, the advantage may well lie with the larger firms. Although if some standard vehicle is bought, the sale of which is coupled with a comprehensive repair and maintenance service, some compensation may be got.

London Transport

Although it is impossible to give every branch of transport its due, I feel bound to add one comment to what I have already said as regards London Transport. which provides public transport by railway, bus and coach for approximately one-fifth of the population. Looking over the evidence submitted before the Joint Select Committee of both Houses on the London Passenger Transport Bill in its favour, and reading again the arguments set out by Mr. Morrison, unquestionably the father of the scheme, in his book entitled "Socialisation and Transport," there is little doubt but that the main thought behind that great experiment was the assumed desirability of mutual financial support between the different forms of transport, in those days the buses to support financially the tubes, the central bus services to enable non-paying services to be provided in the country and on the periphery of the area served, and through pooling receipts with the main-line railways, still further to depart from the principle of the financial viability of each and every form of transport, and of the various services within them.

* Abstract of a lecture to the Royal Society of Arts. The author is Sir Ernest Cassel, Reader in Commerce at the London School of Economics.

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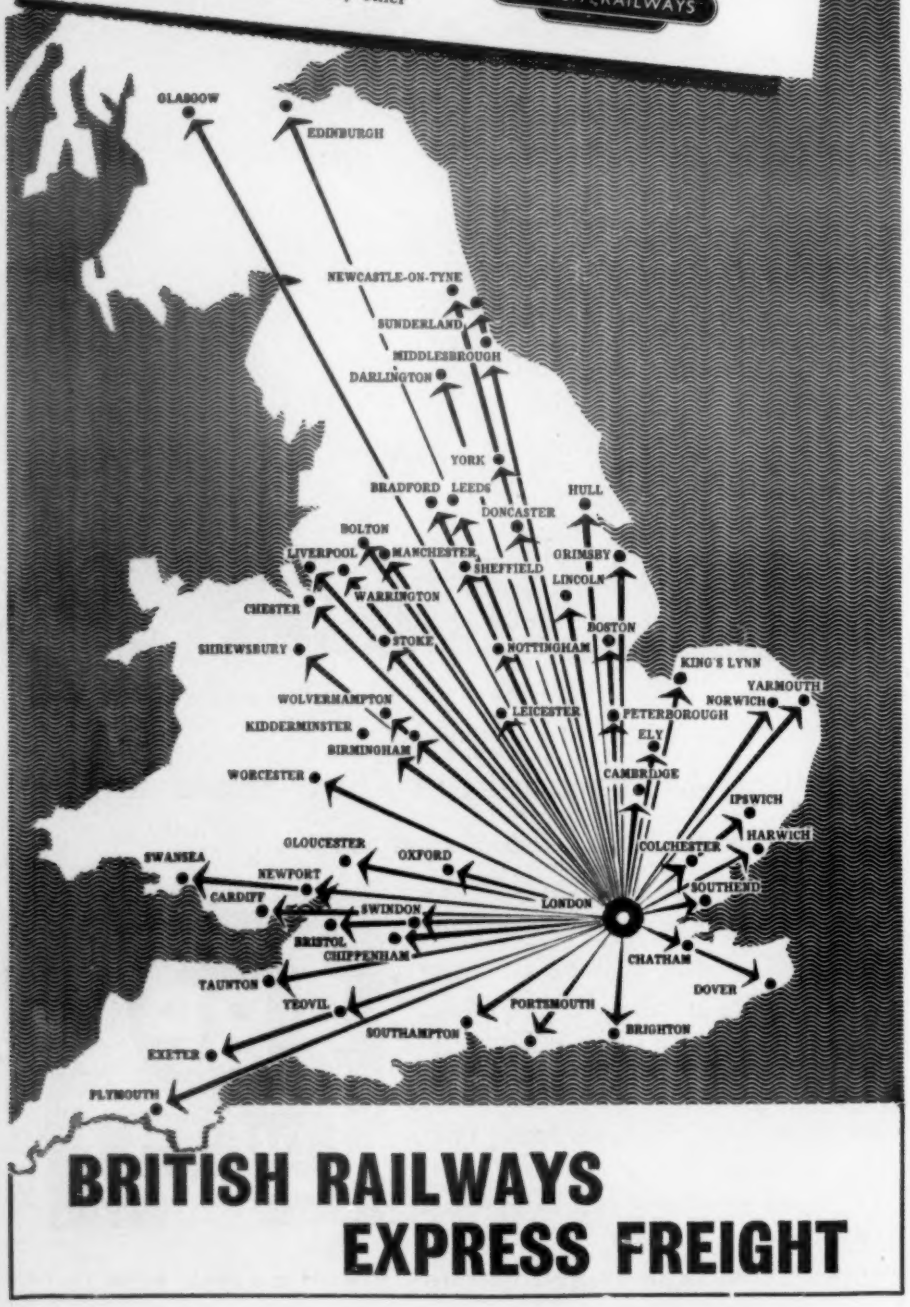
BRITISH RAILWAYS



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NEWS FROM ALL QUARTERS

Continuous Welded Rail for C.N.R.

A 50-car train carrying 10 miles of continuous 132-lb. welded rail, to be used in the Canadian National Railways track improvement programme, was recently delivered to Debert, Nova Scotia.

Two Southern Region Branch Closures

The Southern Region has informed the South Eastern Transport Users Consultative Committee that it wishes to withdraw passenger services on the branch line from Hoo Junction, Kent, to Allhallows-on-Sea and Grain and the London area committee similarly regarding the Dunton Green—Westerham branch.

October Start for Rotterdam Underground

Work on the underground railway between the centre of Rotterdam and districts south of the Meuse is to start in October, as soon as the international horticultural Floriade exhibition has closed. The line will have seven intermediate stations in a total distance of about three miles. The main boulevard, the Coolsingel, is expected to be closed to all traffic for at least two years.

Backer Sought for 107-Mile Toll Road

Private enterprise has been asked by the New South Wales Government to finance and build a toll road between Sydney and Newcastle. A new fast road between Sydney and Newcastle, 107 miles apart by road, will give a tremendous boost to business and commerce. Detailed information on the new proposal is available at the New South Wales Government Offices, 56 Strand, London, W.C.2.

Route to New Runcorn Bridge

Work has now started on the 2¼-mile long Runcorn Spur, which will form the southern approach road to the new Runcorn—Widnes Bridge over the Manchester Ship Canal. The road will start at Doctors Bridge (A577) at a roundabout junction with the bridge approaches. A flyover junction will carry it over Heath Road (B5310) to which it will be linked by slip roads. An underpass will take the Spur under Boston Avenue, and it will end at Northwich Road (A533) near Hallwood. The spur will have a single 33-ft. carriageway.

East-West Highway in South America

Unnoticed by the world at large some fantastic road building feats are being undertaken to link the new inland capital of Brazil, Brasilia, with other states. Already Brasilia has been linked with Rio de Janeiro; now it is intended to drive a road right across the continent, linking the Pacific and the Atlantic for the first time. In just under 14 months, 3,700 men have built a road, 1,370 miles long from Brasilia northwards to Belem on the Amazon, now an ocean port. Then, in March, work started on an even more fantastic project—a 2,000-mile route from Brasilia to Rio Branco, near the Bolivian border. For this nine months have been allowed. The final stage would be a 520-mile extension to the Peruvian frontier thus linking Lima with Brasilia, São Paulo and Rio de Janeiro.

Dock Charges Schemes Inquiry

A public inquiry into B.T.C. harbour charges schemes for Hull, Grimsby, Lowestoft and Fleetwood will open at the Niblett Hall, 3 (North) Kings Bench Walk, Temple, on May 3.

Station Re-Opened as a Halt

Rhu Station has been reopened as an unstaffed halt for passengers travelling on the Craigendoran-Arrochar diesel railbus on this Scottish Region line. Booked stops will be made by certain railbus journeys and request stops by others. The reopening was on April 4.

A.W.C. on North-East Main Line

In the early hours of tomorrow (Sunday) the new colour-light signalling and automatic warning system recently installed by the North Eastern Region on the 13-mile stretch of the East Coast main line between Tweedmouth (South signalbox) and Belford (Crag Mill signalbox) to replace the old semaphore signals, is to be brought into use.

Liverpool Underground Station

James Street Station, Liverpool, which handles more than 14 million passengers a year, is to be modernised. The station is on the Wirral electric line. A new subway and passenger way across the line is to be constructed, additional exits provided and a hydraulic lift replaced by two new electric lifts. New exits and two new electric lifts to replace an old hydraulic lift are to be provided at Birkenhead Hamilton Square Station, which handles 12,500,000 passengers a year.

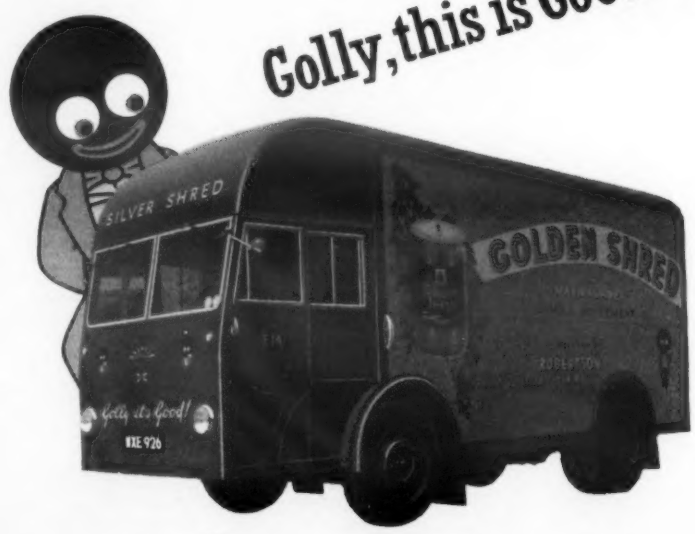
Lancaster Motorway Opened

In time to relieve holiday traffic jams in Lancashire roads, Dr. Charles Hill, M.P., Chancellor of the Duchy of Lancaster, opened the £4 million Lancaster Motorway on Monday, April 11. The whole cost of the road will be borne by the Ministry of Transport. Starting from Hampson Green on the London—Carlisle trunk road (A6), it sweeps northwards to by-pass the city of Lancaster and the districts of Carnforth, Slyne and Galgate—all bottlenecks for the heavy traffic which used the road—and emerges on A6 again at Keer Bridge, just north of Carnforth.

Rayleigh By-Pass

The Minister of Transport has made a grant of £292,500 to the Essex County Council towards the cost, estimated at about £390,000, of a new road to by-pass the congested streets of Rayleigh village on the Chelmsford road (A130). It will enable traffic on the Chelmsford road to enter and leave the Southend Arterial Road without touching Rayleigh. It is expected to take 7,500 vehicles a day off the main streets of the village. With twin 24-ft. wide carriageways, the new road will run north from a two-level junction on the Southend Arterial Road, 1½ miles west of the Rayleigh Weir roundabout. It will cross under the railway to a new roundabout on the Billericay Road (A129); and from this point to Rawreth the Chelmsford road will be rebuilt on a modern alignment.

Golly, this is Good too!



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COMMERCIAL AVIATION

Short-Distance Aids

FUTURE OF SPEKE

THE council of the International Civil Aviation Organisation on April 8 adopted standards for short distance air navigation aids by extending the existing international standard VOR (very high frequency omni-directional radio range) and supplementing this by a form of distance measuring equipment (DME) to be used where needed for more precise navigation and air traffic control. By adopting Amendment 35 to Annex 10 to the Convention on International Civil Aviation (International Standards and Recommended Practices for Aeronautical Telecommunications), the council provided that:

VOR shall be the standard aid for en-route and terminal purposes, both for air traffic control, and for the safe and efficient conduct of aircraft operations. It is intended that, wherever VOR is installed, no change in the standard will require the replacement of such equipment before January 1, 1975.

A new type of distance measuring equipment will be an international standard to be used as a complement to VOR at localities where, for operational or air traffic control reasons such as traffic density or proximity of route, there is need for a more precise navigation service than that provided by VOR. DME will also be protected until January 1, 1975.

If a distance measuring facility is installed and maintained in operation for any other radio navigational purpose, this equipment should conform to the specification of DME adopted by I.C.A.O.

The 77 member states of I.C.A.O. will have until September 1, 1960, to disapprove all or part of Amendment 35. The amendment—or that portion of it which has not been disapproved by a majority of these states—will then become applicable on January 1, 1961. It may be recalled that Britain has represented strongly that the Decca Navigator is a more effective short-distance aid.

K.L.M. to Serve Jeddah

As from April 26, Jeddah in Saudi Arabia is to be served by K.L.M. (Royal Dutch Airlines). Initially there will be a once weekly flight with a Lockheed Electra. This will be an extension of flight KL 547 which at present serves Dusseldorf, Vienna, Istanbul, Ankara and Cairo.

More B.O.A.C. Comet Capacity to South America

British Overseas Airways Corporation Comets on the route between the United Kingdom and South America had their passenger capacity increased from April 1. Both weekly services carry 20 first-class and 48 tourist passengers. This gives five more seats than the previous capacity on this route of 20 first and 43 tourist passengers.

Liverpool and Speke

Liverpool City Council has now decided to take over the control of the city's airport at Speke when it is released by the Ministry of Aviation and it is estimated it will entail a charge on the rates of 1½d. in the £. It is estimated the operating deficiency for the time being will be about £68,100 a year based on the income and expenditure for 1958-59, but a hopeful future is anticipated from a report prepared by the town clerk (Mr. T. Alker), the City engineer and surveyor (Mr. H. T. Hough) and the city treasurer (Mr. J. Ainsworth). It is anticipated there will be a general increase in national and international traffic which should lead to the increase in existing services and the creation of new ones. Three new operators will be using the airport almost immediately.

Aer Lingus Increases Freight Services

Aer Lingus increased its regular freight services between Manchester and Dublin from three to four flights a week from April 1. Aircraft leave from Manchester Airport at 02.40 hr. on Tuesdays, Wednesdays, Fridays and Saturdays, and from London Airport on Saturdays at 04.30 hr. and on Monday, Tuesday and Thursday at 03.30 hr. These timings have been arranged in order to allow the maximum period for delivery of cargo to the airport, while maintaining the speed of delivery. Last year a total of 4,587,799 kg. of freight, mail and newspapers was carried by the airline's northern services. This represented a steady rate of increase over the past few years, and was in fact just over 1 million kg. more than the figure of 3,504,184 for 1957. On the London—Dublin service 1,108,592 kg. of freight were carried in 1958 by Aer Lingus and this figure rose to 1,353,300 kilos last year.

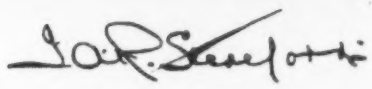
Traffic at Schiphol

Every eight minutes on average during 1959 an aircraft landed or took off at Schiphol Airport, Amsterdam. Last year two types of jet airliners regularly called at Schiphol and several others will follow in the course of 1960, including the 12 DC8s about to be delivered to K.L.M. In order to be able to cope with the additional traffic, a start was made with the construction of a new runway which will have a length of 11,000 ft. and is expected to be ready in April. For the first time since the opening of the airport 39 years ago there were more than one million passengers (1,134,787), i.e. an increase of almost 17 per cent compared with 1958. In the summer months there were peak days of 5,000 passengers daily. Air freight traffic rose by as much as 25 per cent, the total for 1959 being 38¼ million kg. Schiphol continues to be a great attraction for sightseers, as is apparent from the number of visitors in 1959: 1,345,000.

T.W.A. Earnings in 1959

Trans World Airlines earned consolidated net profits of $9,402,000 (£3,357,000) in 1959 compared with a net loss of $1,764,000 (£630,000) in 1958, it has been reported by Mr. Charles S. Thomas, the president and chief executive. This profit was the second highest in T.W.A.'s history. Gross revenues of $348,458,000 (£124,449,000) were $63,617,000 (£22,720,000) or 22 per cent greater than a year ago. This increase resulted from carrying a 25 per cent greater volume of traffic. Cash operating expenses of $297,120,000 (£106,114,000) were held to an increase of $43,534,000 (£15,547,000) or 17 per cent. Profit from operations was $17,263,000 compared with a loss of $375,000 the year before. Non-operating income (net) was $138,000 compared with non-operating expense (net) of $2,749,000 the previous year. The 1959 figure reflected higher gains on sale of equipment, greater interest earned on short term U.S. Government security holdings and lower interest payments on a lower level of debt. Mr. Thomas said that the company had plans to expand its participation in the cargo market and would modify a number of long-range 1649A Constellations for cargo use, supplementing the fleet of eight 1049H Constellations at present in scheduled freight service. Jet cargo plane types were also being studied as the ultimate solution for capitalising on the cargo potential envisioned during the 1960's.

SPECIAL ADVISORY GROUP ON B.T.C.



Sir IVAN STEDEFORD, K.B.E.

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Chairman of the group which has been appointed by the Minister of Transport to examine the structure, finance and working of the organisations at present controlled by the British Transport Commission and to advise as a matter of urgency on how to give effect to Governmental intentions, is Sir Ivan (Arthur Rice) Stedeford, chairman and managing director of Tube Investments, Limited. He has played a large part in the development of an undertaking which, besides its interests in Britain, now has overseas associate or subsidiary manufacturing and trading companies in Australia, Canada, India, New Zealand, South Africa, Southern Rhodesia and Argentina. Born in 1897, he was educated at Shebbear School, thereafter serving a five-year mechanical engineering apprenticeship with Vickers, Limited. This completed, he volunteered for the Royal Naval Air Service and was in due course commissioned as an observation officer. Upon demobilisation he entered the motor trade and established a flourishing business in Birmingham, but he was persuaded in 1928 to become sales director of Tubes, Limited, a founder-member of Tube Investments, Limited, and, within three years, was joint managing director of the company. He was elected to the board of the parent company in 1935 and four years later he became managing director, the post which he still occupies together with the office of chairman, to which he succeeded in 1944. The wide range of products for which the T.I. group is responsible makes it particularly necessary for its companies to possess a high degree of autonomy, and this is the aim of the control system which Sir Ivan has evolved for it. His other interests include membership of the board of the Commonwealth Development Finance Co., Limited, and directorships of the National Provincial Bank and the Atlas Assurance Co., Limited. He was a governor of the British Broadcasting Corporation, 1951-55, and from 1949 to 1952 was a member of the committee of inquiry into the B.B.C. presided over by Lord Beveridge. He was also a member of the advisory council of the Department of Scientific and Industrial Research, and of the United Kingdom Atomic Energy Authority, 1954-59. He was created a K.B.E. in the Birthday Honours of 1954.

IN PARLIAMENT

The B.T.C. Advisory Group

MAY MAKE EARLY RECOMMENDATIONS

HAVING announced the members of the advisory group on B.T.C. planning (MODERN TRANSPORT last week) the Minister of Transport inevitably had to defend himself against Opposition criticism that neither the B.T.C. nor the trade union movement were represented. Said MR. E. MARPLES: "We did think of having the Commission represented, but, on reflection and after a great deal of thought, it was decided that the advisory body should be small and that neither the Commission nor the trade unions should be on it—because the advice of the Commission and the unions can best be put forward without inhibitions and in all freeness if they are not on the body itself. The body will not be executive, but purely advisory. Its terms of reference are extremely wide and I am quite certain that it will take into account other forms of transport when giving its advice."

The Liberal leader, MR. JO GRIMOND, suggested that it was implicit in the Minister's statement that the Commission was at present incapable of running its own business. "If that is so, why does the right hon. gentleman not get rid of those members, and, if these people know more about transport, put them on the Commission instead? Can the right hon. gentleman say when the new body is expected to report, and whether the Government intends to do anything whatever about the railways until it does report?" Mr. Marples said he did not know, but he would be in close touch—weekly or fortnightly—with it, so that if it made recommendations immediate effect could be given to them.

MR. D. DONNELLY took up the theme and carried it further—surely there were people in the Ministry with a fund of knowledge about the railways and experience of transport problems in this country, so that it should not be necessary to go outside the Ministry to seek the expert advice that the Government should be having? Mr. Marples countered that the advisory body was not necessarily to give expert advice. It would be considering expert advice which was given to it. It would be in close touch with the Commission and the unions, and they and anyone else might make any recommendations they wished. The secretary of the Special Advisory Group on the B.T.C. is Mr. O. F. Gingell at Room 360, Ministry of Transport, The Adelphi, John Adam Street, W.C.2.

Kingsway Subway Plan At Last

MR. E. MARPLES told a questioner that the London County Council proposes to adapt the southern part of the former Kingsway tram subway as an underpass for light traffic between Waterloo Bridge and Kingsway. It is expected that the greatest advantage will be obtained by making the underpass one-way from south to north. He hopes to give the go-ahead at an early date.

Gross Weight of Bulk Liquids Tankers

MR. G. A. PARGITER asked the Minister of Transport about the proposed regulations raising the maximum gross load from 24 to 28 tons for bulk liquid tanker vehicles. The delay in coming to a conclusion in regard to this matter was causing difficulties to manufacturers and operators. MR. E. MARPLES said that in addition to these considerations, others, including safety considerations, had to be taken into account. He hoped, however, before long to reach a decision on the subject.

Road Authorisation and Expenditure

MR. GRESHAM COOKE taxed the Minister of Transport that capital authorisations for new road schemes in Great Britain for the four years ending 1961-62 amount to £280 million but some £250 million of this sum will have been authorised by 1961, leaving only £30 million for the fourth and final year of the present programme. MR. ERNEST MARPLES said that the road programme was determined by the level of actual expenditure approved for each year. Schemes were authorised to meet these levels. The announcement in January, 1959, that the road programme would be planned on an annual expenditure of not less than £60 million in 1961 and beyond in effect superseded the earlier announcement about authorisations.

★

ROAD TRAFFIC ACT, 1960

New Section Numbers for Old

NOTHING in law is changed by the appearance of the Road Traffic Act, 1960, since this is simply a consolidating measure, but several well-known references to earlier Road Traffic Acts will have to be relearned under their new section numbers. The Act received the Royal Assent last month; it runs to 271 sections and 20 schedules and costs 10s. 6d. net from H.M. Stationery Office.

The whole of the remaining provisions of the London Traffic Act of 1924 are hereby repealed, together with sections 1-50 of the 1930 Road Traffic Act (classification of vehicles, driving licences, driving offences, third party insurance and so on), the whole of Part IV of the Act, relating to the licensing of public service vehicles, and all the schedules. Also repealed is Part I of the 1933 Act (licensing of goods vehicles). The associated sections of the 1934 Act also go, as does virtually the whole of the Road Traffic Act, 1956. Many other statutes are repealed in whole or in part. The whole of the Motor Vehicles (Variation of Speed Limit) Regulations, 1956, are revoked. The primary effect of these was to raise the speed limit for heavy goods vehicles to 30 m.p.h.

Licensing Sections

Licensing of public service vehicles forms Part III of the 1960 Act but sections 101 and 102 of the 1930 Act, well-known in connection with the "consent" procedure required of municipal bus undertakings, remain in force. Section 93 (the "fair wages" clause) becomes section 152 in the new measure. Of more importance, perhaps, to the goods transport section of the industry is section 19 (limitation of drivers' hours), henceforth "section 73." In the licensing of goods vehicles (Part IV) section 1, providing exemptions, etc., becomes section 164. Section 6, determining the discretion of the licensing authority, will in future be cited as "section 174" and, of course, incorporates the amendments introduced in the 1953 Transport Act and another oft-quoted provision, section 13, under which a licensing authority has power to revoke or suspend licences, appears anew as section 178.

Speed limits are laid down in the first schedule to the new Act, the "special occasion" requirements for a public service vehicle are specified in the twelfth schedule, the relative section in the Act being section 118.

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SIGNALLING PRACTICE OF L.T.E.

Presidential Address to I.R.S.E.

RAPID progress had been made in the signal engineering profession during the past few years and a part of the very wide field it now covered was the maintenance of signalling equipment. Increase in efficiency was shown by decrease in failures per unit of apparatus. This was the opening theme of Mr. W. Owen's presidential address to the Institution of Railway Signal Engineers when he was installed in the chair at the annual general meeting on April 6. His remarks had, he said, necessarily to be confined to signalling practice on the London Transport lines for that was where he had gained his signalling experience during the past 30 years.

Safety was of paramount importance in all that the signal engineer had to do and this requirement took precedence in any development that might be taking place. Apart from this the two main objectives were reduction in the failure rate of the signalling apparatus and economy in the capital and depreciation costs of the installation. Reduction in signal failures often occasioned a rise in maintenance charges and if these were too severely curtailed the number of signal failures increases. The signal engineer's problem was to endeavour to achieve a satisfactory balance between the two. On the London Transport railways the signal failure rate was 0.153 failures per unit per annum in 1933 and 0.024 in 1959.

Failure Reduction

The design of new equipment and apparatus had a direct influence on signal failure reduction. The new equipment was such that it could be installed with the assurance that it would function for a given period with the minimum of maintenance and without any form of site repairs. Electrical connections were designed so that wires need not be removed from terminals if a unit has to be changed and the fixings were arranged so that this operation could be quickly performed.

The train stop was one of the most important items amongst the London Transport's signalling equipment. This used to consist of a long base plate having at one end an air cylinder arranged to push a spring-loaded rod which operated a crank mounted on an horizontal shaft at the forward end of the base plate. The train stop arm was fitted to this shaft. All bearings were of the plain journal type open to the weather and failures could only be reduced to a minimum by frequent oiling and examination. The circuit controller for proving the fidelity of the head of the train stop arm was fitted separately and joined by a connecting rod and a number of pieces had to be disconnected and handled when a train stop needed changing.

Sealed Units

Constant improvements had been made to the design of this layout and at the present time all the operating parts were included in one case. The bearings were of superior design and all moving parts were constantly lubricated from an oil pump and reservoir in the bottom of the case. The circuit controller for proving the train stop was a sealed unit contained inside the case and was supplied with a quickly released cable entry and connections. To remove this unit it was only necessary to remove and replace four nuts in addition to the electrical and compressed air connection. This latest design in train stops would operate satisfactorily for five years and after this period it was removed whether it required shop service or not.

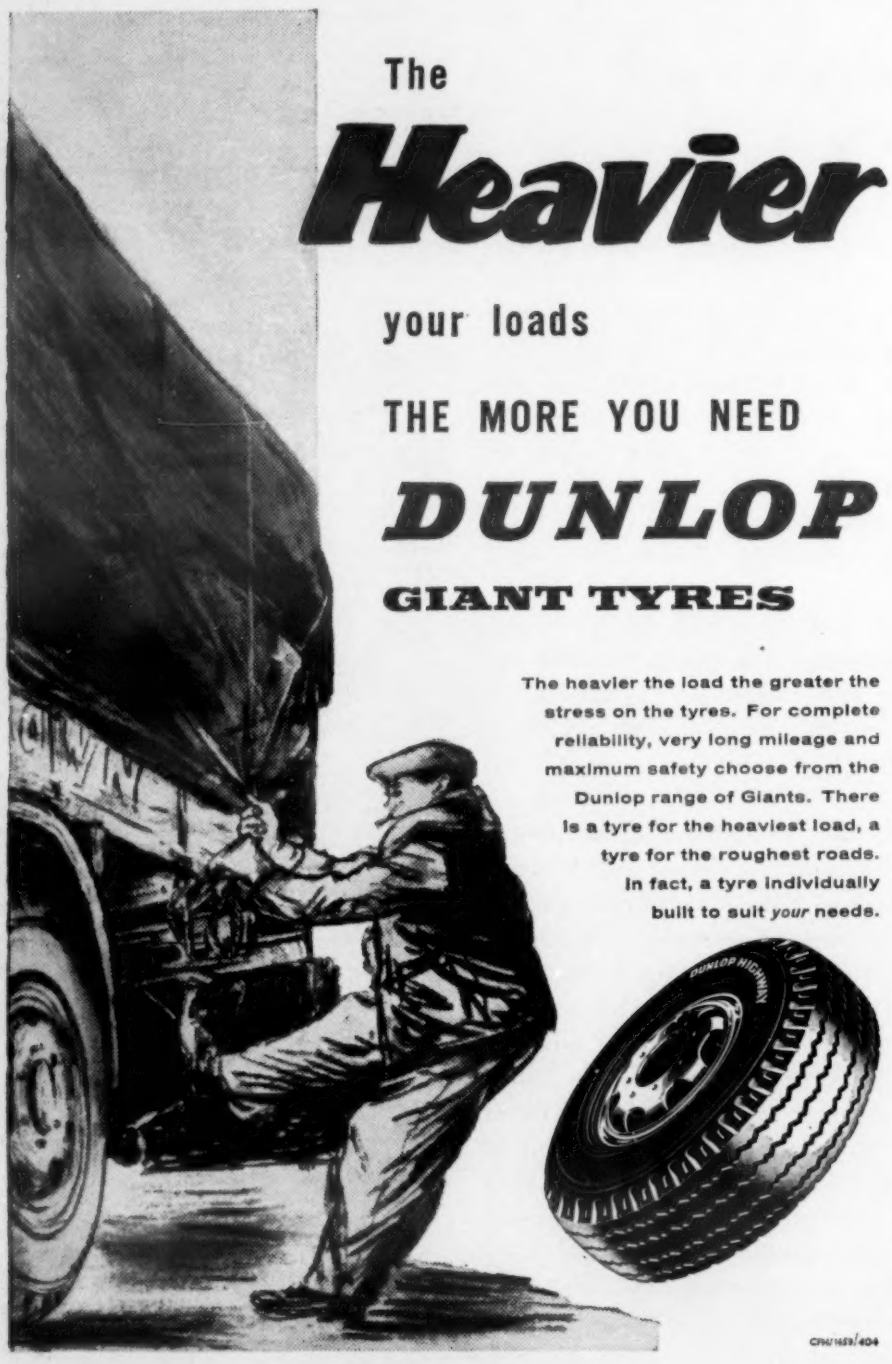
Connections to track equipment used to be made by cables run in concrete troughing but the present practice was to use a screened 10-core cable with pre-formed connections at the end and moulded in position. Train stops installed on open sections of the railway were liable to failure in the winter season by the formation of compacted snow jamming the train stop arm. A bellows was fitted at this vulnerable position which operated with the movement of the train stop arm, blowing the snow away. Snow and ice was also liable to cause point failure, particularly in blockage of the slide chairs. This was overcome by pumping hot oil through cavities in the slide chairs and through pipes in contact with the point mechanisms.

The London Transport railway signal department had also adopted prefabrication for new works. The colourlight signal was now a standard item of equipment and had long since replaced the former air-operated semaphore signal. The apparatus necessary for a signal was now fitted into a common case and this also included the air valve for the train stop. The apparatus inside the case was prewired in the signal shops and at site it was only necessary to connect the air supply and external cables.

Programme Machine

Mr. Owen went on to discuss the programme machine which had permitted the automatic control of signalling in accordance with a timetable and the supervisison of a whole tube line. Control of the signalling had been placed on the machine and it was only necessary to provide an observer or regulator to intervene in cases of emergency. It was possible to visualise development of the programme machine for the control of complicated layouts and train movements such as were encountered in rolling stock marshalling yards.

The simple signalling circuit used in the early part of the century had developed into a highly complicated system and standardisation of circuits and unit application had been adopted as widely as possible. The rate of progress in the development of signalling equipment had accelerated in recent years and would become even faster as the coming years approached. The wayside signal might be replaced by cab signals and some of the more conventional methods of signalling now so well understood might eventually disappear. Such developments would not minimise the signal engineer's work but would make it even more complicated and scientific. The practical problems could be easily overcome but theoretical difficulties would require personnel with a wide scientific knowledge. In many signal engineer's departments and technical institutions, signalling classes were held culminating in an examination. Institution of technical courses in railway signalling and allied subjects could enable students to qualify by examination for a diploma or national certificate such as was given for other subjects at the present time.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Commonwealth Air Fares

MINISTER ANNOUNCES NEW RATES

ANSWERING questions in the House of Commons last week the Minister of Aviation, Mr. Duncan Sandys, made a statement on air fares, announcing a number of new low-cost rates on the main cabotage routes. He recalled that although fares for services in Europe, between Europe and South America, and between North and South America, were settled at the International Air Transport Association annual traffic conferences in Honolulu last autumn, the conference separated without reaching agreement on fares for the rest of the world. This was largely because of the demand for the introduction of cheaper fares put forward by B.O.A.C., in agreement with the Government.

The conference having thus broken down, he announced last December his decision in principle to authorise B.O.A.C. to reduce its fares on British cabotage routes to the West Indies, Africa, and the Far East, for which international agreement was not required. Thereupon, said Mr. Sandys, I.A.T.A. decided to reconvene its conference. Subject to some increases in certain first-class rates it had, with effect from October 1, agreed to general reductions in the cheaper class fares. The new economy class fares would be up to 16 per cent below the present tourist class rates.

New Classes of Fares

"These reductions do not go as far as B.O.A.C. proposed," the Minister said, "but this is a welcome step in the right direction. I have now formally approved these new fares, and I have authorised similar economy class fares on the main British cabotage routes. Subject to clearing up some outstanding points with the colonial Governments concerned I have, in addition, decided to authorise certain new classes of fares on our British routes, at very much cheaper rates. These will include special low fare services to East Africa, Central Africa, Aden, Bermuda, the Bahamas, the West Indies, Singapore, and Hong Kong. The new fares will be lower than the colonial coach fares, where these now exist, and will be between 25 and 30 per cent below current tourist rates.

"On these routes I propose also to authorise still cheaper fares for inclusive tours. Special rates will also be introduced for students traveling in off-season months. These will be between 40 and 50 per cent below present tourist fares."

Corporations and Independents

"Unless some special action were taken, drastic reductions of this kind by B.O.A.C. would completely undermine the cheap air services which the independent airlines have built up. I therefore asked the corporations and the independent companies concerned to discuss the problem and see if they could not work out together some mutually satisfactory arrangements. These discussions have resulted in agreements which will, I am sure, prove beneficial to the corporations and the independents, as well as to the travelling public.

"Airwork and Hunting Clan, now to be known as British United Airways, will share with B.O.A.C. the economy class and third-class services to East and Central Africa. [This also involves East African Airways and Central African Airways.] The Eagle airline, in which the Cunard Shipping Company have acquired a majority holding, will operate services of all classes between Britain and Bermuda, in parallel with B.O.A.C. Partnership arrangements have likewise been made between B.E.A. and Skyways on the London—Malta route and between B.E.A. and British United Airways on the route between London and Gibraltar. The House will, I am sure, welcome these agreements between the Corporations and the independents, which will, I hope, lead to fruitful co-operation in the years ahead. It will also, incidentally, dispose of some of the most controversial issues with which the new Licensing Board would otherwise have had to grapple."

The London Midland Region announces that electric trains will begin operating between Manchester London Road (to be renamed Piccadilly) and Crewe on September 12, by which time alterations to the Manchester layout will be completed.

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C.A.V. Work on Diesel Engines

By Dr. A. E. W. AUSTEN, A.M.I.E.E., F.Inst.P., Chief Engineer, C.A.V., Limited*

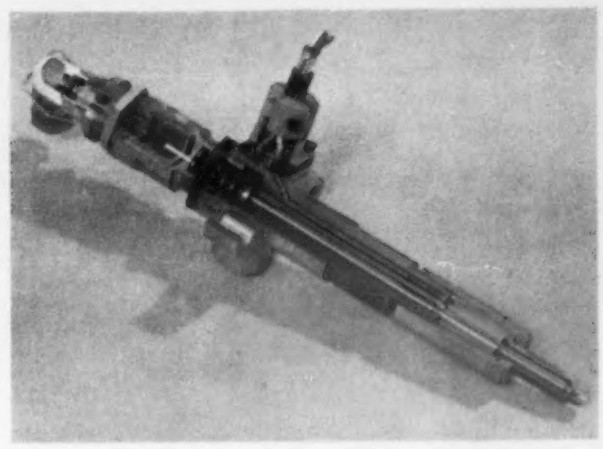
MY job is to say why we do combustion research, what we do, and what we hope to achieve. The injection equipment is the most vital part of the diesel engine. It controls directly power, consumption, shape of torque curve, noise, smoke, cold starting and so on. What is demanded in these respects is becoming more and more stringent and the requirements often conflict. For example: it is not difficult to quieten an engine at some expense in consumption; and power can be increased but at some price in the amount of smoke at full load. In order to get all these performance criteria at their optimum values at the same time, or to arrive at the most acceptable compromise we need a quantitative understanding of the whole process. We want to arrive at the point where a diesel combustion and injection system can be designed numerically in just as precise a manner as can the stress and rate of a coil spring.

In the longer term we are aiming at basic improvements of performance. We are already very close to the limit of what is theoretically possible as regards consumption but there may be something to come in maximum power or torque, that is to say (expressed as it depends on combustion) an increase of air utilisation above the 70 per cent or so at which, so far, exhaust smoke becomes noisy. So we need to smooth the cylinder pressure rise.

Now at once we have a problem. This is obviously less efficient than burning instantaneously to maximum pressure, and we need to know how far we can go in smoothing the cylinder pressure rise before we begin to lose intolerably in efficiency. This can be answered by calculation and we have done a good deal of calculation of cycle efficiencies and their dependence upon rate of pressure rise and other such quantities. We can also answer many other questions such as, what is the optimum peak pressure for a given compression ratio? How much do we lose in efficiency from a given departure from this ideal shape, which, of course, cannot in any case be achieved? and so on.

Our next line of attack leads on directly from these calculations. We ask what kind of diagram have we got and how can we modify it. To answer this clearly we need to measure cylinder pressure and we also need to measure what controls it—that is to say, the rate of fuel input. We can now do both, though behind that simple statement there lies many years' work.

From instruments we get records of cylinder pressure, needle lift and pipe pressure. From these quantities we can calculate the quantities we really want to know. But the calculation is rather laborious and for this reason it is carried out on a digital computer, which produces what we want to know—the way in which heat release varies with a given variation of fuel flow.



Short tube gauge and needle-lift gauge developed by C.A.V. small enough to be installed in a fuel injector

Direct-Injection Engines

We have found that in direct-injection engines there is a fairly simple relationship between fuel flow and heat release. For a given direct-injection engine and nozzle there is a consistent relationship between fuel flow and heat release (and therefore cylinder pressure), which is to a reasonable approximation independent of speed and load and timing. This means that any given engine, once the form of this relationship has been determined for any injection characteristic, that is to say, form of fuel flow against crank angle, we can determine what cylinder pressure will result from any other form of fuel flow.

This technique is an extremely powerful one. It means that when in a given engine with injection nozzle we have once determined the nature of this relationship between fuel flow and cylinder pressure, we can explore the effect of any injection characteristic we like; or we can use it the other way round and we can take what we know to be the ideal form of cylinder pressure and from it calculate the nature of the injection characteristic which would give that form of cylinder pressure. To go the rest of the way and determine, from the nature of the injection characteristic, the injection equipment specification which would give that characteristic, is of course another matter beyond the scope of the present talk.

I may say, however, in passing that it is by no means easy. And to go, as one of course must, the rest of the way and achieve the ideal characteristic over the whole of the load and speed range is an exceedingly formidable problem. But at least this technique enables the problem of arriving at the best fuel-injection equipment specification to be put with complete clarity to the injection engineer.

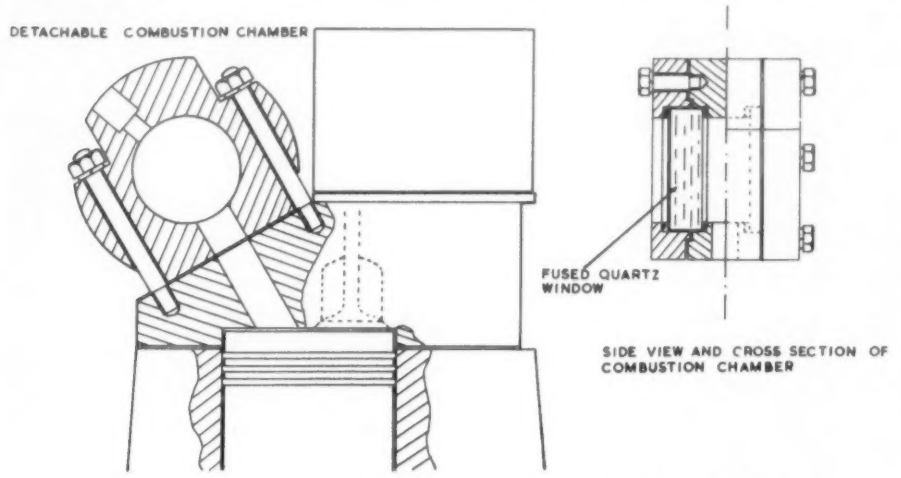
The next example I want to give of the technique we have developed is concerned with noise. It is a not unfamiliar circumstance that a particular engine may be noisier than another comparable engine and indeed unacceptably noisy. The question then arises whether the engine is noisy because of a particularly unfavourable form of cylinder pressure, in which case it is of course the injection equipment which is wrong, or, on the other hand, is it that the engine has a particularly unfavourable structure, in which case it is not our affair? It is possible in the case of gross discrepancies to look at cylinder pressure diagrams and to say that one is obviously far too abrupt and must be noisy, but we need to make this quantitative.

It is quite appropriate to regard cylinder pressure itself as a noise, indeed it is and a very loud noise. We can, therefore, make a frequency analysis of it, which with the corresponding cylinder pressure diagram will determine whether cylinder pressure or engine structure is wrong. This method of analysis has enabled us to establish quantitatively many of the basic phenomena of the generation and radiation of that part of engine noise we are particularly concerned with, that is to say, the kind of noise commonly called "diesel knock," which is characteristic of diesel engines.

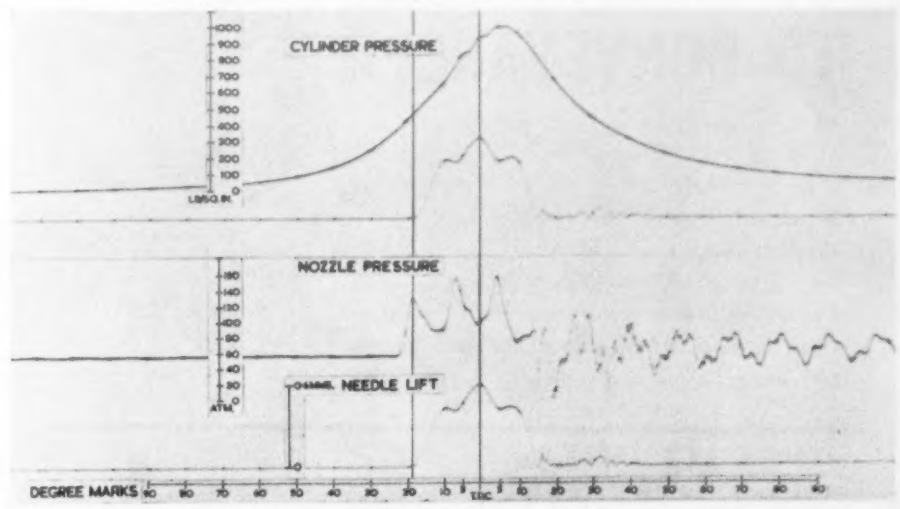
Resonance

While we are still on noise, many engines are very much noisier than they need be because of rather unsuitable resonant covers, such as valve covers, over parts of the engine. Replacing these covers with covers which are "dead" and cannot resonate often produces considerable quietening.

The last method I want to describe is flame photography. There comes a time in most investigations when one supposes a particular mechanism to be occurring in a diesel engine. It is then of very great advantage to be able to take a look inside and see directly whether it is or not. For this, we use flame photography. An engine converted to this purpose is a normal single-cylinder test engine, which we have equipped with a special head consisting of a passage and a disc-shaped chamber above it, the disc-shaped chamber being provided with quartz windows back and front.



Diagrammatic arrangement of modified test engine used for flame photography



Oscillograph records of cylinder pressure, hydraulic pressure at the nozzle and needle lift obtained with instruments developed by C.A.V., Limited

unacceptable. And if at any point we find that no improvement is possible, we want at least to establish just what is the physical limit and why.

Complex Process

Combustion is a very complex process and even in the fairly simple case of flames in homogeneous mixtures there are hardly any which are fully understood. Still more is this the case with the heterogeneous combustion, liquid and gas, that we have to deal with in the diesel engine. So all this will not be done in a short time. We have already been some years at it and to go all the way will take many more. But we expect to get, and indeed are already getting, a great deal of information which can be applied immediately as we go along. Our field is very wide.

In a diesel engine we compress the gas up to top dead centre and then expand it again. The most efficient thing to do is to burn the whole of the fuel instantaneously at top dead centre and then expand it. This, however, leads to fantastically high cylinder pressures which the engine wouldn't stand, so instead we burn up to the maximum acceptable pressure, and continue to burn the rest of the charge in a way which keeps the pressure constant and then expand. Even this, however, won't do because the sudden rise of pressure at top dead centre is closely similar to a hammer blow on top of the piston, and such a system would be impossibly

*Abstract of a paper read at the C.A.V. Southern Areas Agents' Conference on March 29.

Cold Starting

We use this rig as a tool in many of our combustion investigations. An example of its use is concerned with cold starting. We have developed and are developing starting aids of this kind in which the inlet air is heated by one means or another. We wanted to know whether the conventional old-established starting aid—the glow plug—was just another means of heating the air in the combustion chamber; or whether it operated in some other fashion. We decided to approximate to cold starting conditions in the special engine and observe what happened.

From this observation we concluded that the heater plug works by providing a source of ignition rather than by heating up the whole air charge.

The engine is used as a means of providing air at the appropriate temperature and pressure, and in which we can control air velocity in any way we please by choosing different throat dimensions. The windows and special photographic equipment enable us to take moving pictures either by scattered light, or transmitted light, by spark shadow photography, or by a special method of illumination called Schlieren photography, with which we can distinguish also air movement and even the distribution of vapour. We can adapt the equipment to give us a fairly close representation of many indirect-injection engines.

Turbochargers for Diesel Engines

SMALL UNITS FOR AUTOMOTIVE USE*

By E. KELLETT

I WOULD like first of all to discuss supercharging as a general topic so that the small C.A.V. turbochargers can be seen in their correct perspective. Supercharging is a broad term, but if we considered the most appropriate definitions, we might say that supercharging is associated with the positively driven compresser (Roots or centrifugal type), turbo-blowing with the lower pressure-ratio charging and that turbocharging is applied to engines using turbine-driven compressers at more than two atmospheres. Supercharging has been regarded in the past as a means of boosting the power of an engine which was not necessarily designed for this purpose. It was usually associated with motor racing or engines employed to the limit of their power-producing capacity.

A more correct application for supercharging is of course the aero engine, where the compresser is a device for providing the engine with a sea-level air supply when flying at altitudes. The performance limits on a gasoline engine are set by the detonation level of fuel and, provided the engine is designed to the capacity of fuel available, then supercharging for normal use appears to have little to offer.

*Abstract of a paper read to the C.A.V. Southern Areas Agents Conference on March 29. The author is head of the turbocharger department, C.A.V., Limited.

Large Marine Engines

Turbochargers for diesel engines, however, are not to be compared with the racing engine supercharger. Turbochargers were first used on large marine engines in Germany in the 1930s and today they are employed on almost 100 per cent of this size of engine. The diesel engine is fundamentally a hot air engine and there are no theoretical limits to the amount of air that can be digested. The practical limitation in the large engine where turbocharging is accepted is in the maximum cylinder pressure that can be withstood, thus limiting the amount of air that can be fed into the cylinder. These large engines are thus frequently pressure charged at fairly low pressure ratios, where the term turbo-blower may be appropriate.

With the small engine the design limit is usually associated with crankshaft speed rather than cylinder pressure. It appears, therefore, that theoretically the small engine should be better for pressure charging provided there are no limits in the turbocharger design. If we compare the economics of the two types of engine, the cost per horsepower of the larger engine will be reduced more significantly by turbocharging than the smaller engine. On the other hand the proportionate increase in horsepower by pressure charging the smaller engine can be greater. The small engine delivering say 200 h.p. in its turbocharged form would cost about £1 per horsepower less than its naturally aspirated counterpart, the difference in weight would be about 22 per cent and a saving in space of 15 per cent would be expected.

Investigations into finding the smallest engine size where the adoption of turbochargers would be economic indicates that engines of about 40 h.p. naturally aspirated are probably the lower extreme. The turbocharger rotor sizes for an engine as small as this would be less than 3 in. dia. and rotational speeds would be approaching 100,000 r.p.m.

Turbocharger Life

Large axial-flow turbochargers with certain exceptions are accepted as having approximately the same life as the engine to which they are fitted and usually have a fair margin of design safety. The scale effect of reducing the size of the turbochargers is principally in the higher rotational frequency adopted to achieve equivalent tip speeds of the rotors; scaling down would be impossible if

(*Continued on page* 10)

As foreshadowed in "Modern Transport" at the time, the County Donegal Railways Joint Committee speedily converted the Strabane and Letterkenny track from Strabane to Lifford into a private road. These views show the track and bridge, the new road on the old formation and a Leyland Tiger hired from C.I.E. on the bridge. It is in C.D.R. red and cream livery

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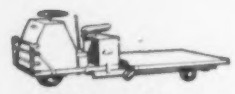

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Turbochargers for Diesel Engines

(Continued from page 9)

the axial-flow type of turbine was retained for the small turbocharger, as the turbine efficiency is considerably reduced when handling the smaller air mass flow. The radial turbine overcomes this difficulty as it performs at good efficiences down to the smallest sizes.

The problem of adopting the radial turbine was initially in the resolution of the process by means of which it could be produced. The engineer's adoption of the ancient jewellery craft of lost wax casting enabled precise heat resisting turbine castings to be produced to fairly accurate limits with good strength properties. Nevertheless, the turbine is still the limiting design feature in these units although the margin of safety is at the moment outside the engine designer's requirements (pressure ratios of up to 3 to 1 or more are possible).

The effect of the high rotational speeds on the design is not always easily appreciated. It should be understood, however, that peripheral velocities are normal and are conservative compared with steam or gas turbines. The small size of these units makes it difficult to use large stiff components in the rotating assembly. The small shaft diameter means that flexibility over a wide range of forcing vibrations must be accepted. The bearing design must, therefore, be carefully resolved. The art is in accepting movement of the rotor shaft without affecting the bearing performance.

Damping Devices

This can be done by designing damping devices into the bearings. There are three methods; namely, mechanical, hydrostatic and hydrodynamic, which can be designed into the bearings in various ways. One example is using silicone rubber rings around the outside of the bearings with an oil weir between them. The hydrodynamic resistance can be provided in the usual way with three or four slots fed with oil in the journal bore. Another method successfully used is to employ bearings free to float on their inside and outside diameters.

Another problem in the small unit is due to its compactness in that the heat pick-up from the hot turbine by the compressed air can be significant. Heat dams and insulating devices are means by which this can be reduced. As the turbocharger is reduced in size so this problem becomes more difficult.

The application of the turbocharger to an engine is physically quite simple in that with its small weight the turbocharger can be supported by the exhaust manifold and the only extra pipe work is a duct from the compresser outlet to the engine air manifold plus an oil feed and drain from the engine lubricating system. Unfortunately the exhaust manifolds are tedious to draw and difficult to make on a one-off basis.

Increased Torque and Power

The effect of fitting a turbocharger which operates at 2 to 1 pressure ratio usually results in an increase in maximum torque of 40 to 50 per cent and maximum power between 30 and 40 per cent. Various torque curves are obtainable from an engine and are achieved by matching the turbocharger and the fuel system. The turbocharger capacity can be adjusted, usually by selection of a turbine nozzle which controls the speed of the unit so that the compresser delivers air appropriate to engine requirements to get optimum performance. With some engines, it is sometimes necessary to vary the size of the compresser and turbine rotors to obtain optimum performance.

The fuelling rate has to be modified so that the increased charge weight is burnt efficiently. This usually means an increase in pump element size to maintain the same time of injection. To obtain the required torque curve, it is usually necessary to select appropriate delivery valves. Developments in fuel equipment specifically for turbocharger applications are proceeding.

It is important for automotive applications that the maximum benefit of available pulse energy be obtained. This means that pulses from the exhaust opening should be spaced at 240-deg. intervals or as wide as possible before being admitted to the turbine. With a two-entry turbine and a six-cylinder engine, this means that cylinders 1, 2 and 3 are connected to one entry and 4, 5 and 6 to the other. The limits in matching can be seen from examination of the compresser characteristic, where for an automotive torque curve the highest pressure ratio at the lowest engine speed is desirable. This means that the compresser may have a tendency to surge. On the other hand the turbocharger must be prevented from overspeeding at maximum power. It is usually sufficient to limit the turbocharger speed by the fuel setting and reserve a sufficient margin for overfuelling.

By arranging for some of the exhaust gases to by-pass the turbocharger at the maximum power conditions, the turbocharger speed can be limited. This method of controlling the energy into the turbine is not always acceptable to the engine manufacturer, as he usually has a dislike for valves in the hot exhaust system.

Temperature Effect

Although turbocharging increases the pressure ratio of the incoming air, the important thing is to increase the weight of air charge. On account of temperature effects, the density of the ingoing air is reduced. If the air at the compresser delivery temperature is reduced to the ambient conditions, the torque and power of the engine can be doubled.

A future development with automotive engines is likely to be in the use of intercoolers and experience has shown that air-to-air radiators are a practical proposition.

A very large number of engines which are not specifically designed for turbocharging have been tested and usually have given good results with no measureable detriment to their life. The Americans, who have been operating turbocharged engines rather longer than we have, report that although the overall life of the engines is shorter, nevertheless the total horsepower hours for a given weight of engine are greater. The main weakness in applying turbochargers to existing engines has been in sealing difficulties with cylinder heads. Particular attention will have to be paid to this feature on new engines intended for turbocharging. Where there has been a weakness in piston design in the naturally aspirated form, the application of turbocharging usually reveals the weakness more quickly.

The cylinder pressures due to turbocharging are increased in proportion to the pressure ratio applied. Unlike the naturally aspirated engine, however, the maximum pressure increases with speed and occurs in opposition to the limiting inertia stresses at maximum crankshaft r.p.m. With a turbocharged engine, the heat to coolant for a given horsepower is reduced, but there is usually an increase in the heat to oil; this sometimes reflects on other design features such as piston cooling. Charge cooling would provide internal cooling and probably extend the design limits on the engine, except for any maximum pressure limits which may exist in the cylinder head joint.

Units In Service

There are about 1,000 C.A.V. turbochargers in service in most parts of the world and it is our impression that they are generally favourably accepted. Where vehicles are used at high altitudes, it is reported that no change in power is felt. Vehicles are operating without derating over the Alps with a 35-ton load using a 5·76-litre turbocharged engine.

The application of turbochargers for an increase in power is an obvious one; other applications are often to extend the range of existing engines. A not-too-obvious application is for purposes of fuel economy where a small turbocharged engine operating with a higher mechanical efficiency than its large naturally aspirated counterparts can be employed. Our experiments have indicated that mechanical efficiency is not changed by turbocharging although the power throughput is increased. The savings in fuel would be extremely significant if, say, a six-cylinder engine could be replaced with a four-cylinder turbocharged one. Our experiments have indicated that savings of up to 12 per cent in fuel are possible.

Turbocharger servicing is a simple matter; routine servicing will mean an occasional removal of the compresser casing for cleaning the rotor and the casing. While this is not essential in normal circumstances, there will, however, be a sacrifice in efficiency due to the accumulation of dirt on the rotor and in the passages. The turbine will automatically clean itself when the engine is operating at a reasonable level of power.

The adoption of turbochargers for automotive engines in the United Kingdom and Europe has been slow for various reasons. European manufacturers, who are just establishing themselves as significant truck producers, have successfully adopted turbocharging. In the United Kingdom the smaller industrial engine (200-300 b.h.p.) manufacturers have been the first to adopt radial-flow turbochargers, as they have enabled them to compete with engines which are too small for the axial-flow unit.

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FORTHCOMING EVENTS

Apr. 19.—Inst.T. (Leeds G. and S.). Four short papers. Leeds City Transport, 1 Swinegate, Leeds, 1. 7 p.m.
R.C.T.S. (West Midlands). W. F. Smallman, "The Festiniog Railway." 84 Holyhead Road, Coventry. 7.30 p.m.
I.R.T.E. (West Regional). Annual general meeting. Liverpool Architectural Society, Bluecoat Chambers, School Lane, Liverpool, 1. 7.30 p.m.
Apr. 19-21.—Scottish Road Passenger Transport Association. Annual conference. Turnberry.
Apr. 20.—I.R.T.E. (North Regional). Annual general meeting. Victoria and Station Hotel, Preston. 7.30 p.m.
Apr. 21.—Inst.T. (East Midlands). Sqdn. Ldr. G. G. H. Ford, "The Role of Road Transport in the Royal Air Force." Eastgates Court Hotel, Lincoln. 1 p.m.
I.Mech.E. S. G. Hooker, "The Future of Air-Breathing Engines in Aviation." Mathew Boulton Technical College, Suffolk Street, Birmingham. 5.15 p.m.
R.Ae.S. (Astronautics and Guided Flight). J. E. Allen, "Reducing Costs of Space Research." 1 Birdcage Walk, S.W.1. 6 p.m.
I.R.T.E. (Met.). A Enticknap, "The Future of Road Transport." Royal Society of Arts, John Adam Street, W.C.2. 6.30 p.m.
I.R.T.E. (Yorks). Annual general meeting. Great Northern Hotel, Wellington Street, Leeds, 1. 7.30 p.m.
Apr. 22.—I.Nav. George L. Hansenn and Richard W. James, "The Economics of Ship Routeing." 1 Kensington Gore, S.W.7. 5.15 p.m.
R.Ae.S. (Agricultural Aviation). "Pilot Training." 4 Hamilton Place, W.1. 7 p.m.
Apr. 23.— Inst.T. (Humberside). Weekend residential course. Cober Hill, Cloughton, Nr. Scarborough.
P.W.I. Visit to Severn Tunnel Pumping Station.
Apr. 23-May 1.—R.C.T.S. "Salute to Steam" Exhibition. Leeds City Museum.
Apr. 26-29.—Institute of Transport. Fortieth Congress. London.
Apr. 27-May 6.—Fuel Efficiency and Power for Industry Exhibition. Olympia.
May 4—5—Municipal Passenger Transport Association. Managers' meeting. Southampton.
May 17—20—Public Transport Association. Conference. Scarborough.

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B.T.C. TRAFFIC RECEIPTS: PERIOD NO. 3—1960

	Four weeks to			Aggregate for twelve weeks to		
	Mar. 27 1960	Mar. 22 1959	+ or —	Mar. 27 1960	Mar. 22 1959	+ or —
	(* thousands)			(* thousands)		
PASSENGERS						
British Railways	9,488	8,860	+ 628	27,353	25,507	+ 1,846
London Trassport						
Road Passenger Services	4,253	4,138	+ 115	12,650	11,931	+ 719
Railways	1,981	1,838	+ 143	5,857	5,510	+ 347
Provinical and Scottish Buses	4,189	4,093	+ 96	12,327	12,018	+ 309
Ships	202	220	— 18	624	681	— 57
Total Passengers	20,113	19,149	+ 964	58,811	55,647	+ 3,164
FREIGHT, PARCELS AND MAILS						
British Railways						
*Merchandise and livestock	8,071	7,929	+ 142	23,775	23,077	+ 98
*Minerals	3,952	3,553	+ 399	11,733	10,635	+ 98
*Coal and coke	9,236	9,660	— 424	28,804	29,911	— 107
*Parcels, etc., by coaching train	4,206	4,206		12,159	11,980	+ 179
Total Freight British Railways	25,465	25,348	+ 117	76,471	75,603	+ 868
Others	4,705	4,218	+ 487	12,755	12,039	+ 716
Total Freight, Parcels and Mails	30,170	29,566	+ 604	89,226	87,642	+ 1,584
Aggregate	50,283	48,715	+ 1,568	148,037	143,289	+ 4,748

*Includes receipts from collection and delivery, etc. Comparisons are affected by changes in fares and charges.

SOCIAL AND PERSONAL

Research Fellowship in Transport

THE study of the economics and administration of transport has long formed one of the interests of the London School of Economics, where Mr. G. J. Ponsonby, the Sir Ernest Cassel Reader in Commerce, with special reference to transport, works in close association with the departments of economics and of business administration. In furtherance of this interest, the School announces that a generous gift of £5,000 a year for seven years made by the trustees of the Rees Jeffreys Road Fund has made possible the establishment of a Rees Jeffreys research fellowship. It is hoped that the first fellow will be appointed in time to take up his duties in the course of the academic year 1960-61. Although the Rees Jeffreys Road Fund has a special interest in road transport, the scope of the research followship, within which the research fellow will select his field of work, is the economics, administration, organisation and regulation of all forms of transport, which may include air and sea as well as inland transport.

* * *

Mr. C. F. Kearton, O.B.E., who has been appointed by the Minister of Transport to be a member of the body to advise him and the British Transport Commission on the future character of the latter undertaking, is a managing director of Courtaulds, Limited. He graduated with a B.A. (first-class) and B.Sc. (research degree) at Oxford and joined I.C.I. in 1933. He went to Courtaulds at Coventry as head of chemical engineering research in 1952, was appointed to the board and

Mr. C. F. Kearton

Dr. R. Beeching

has been a managing director since 1957. He is also deputy chairman and the senior managing director of British Celanese, Limited. Mr. Kearton was appointed chairman of the Electricity Supply Research Council in January this year, having been a member since 1954; he is also a part-time member of the United Kingdom Atomic Energy Authority. Among his many responsibilities in Courtaulds are included the detailed direction of the development of new products, but he has also negotiated contracts in the U.S.S.R. for four plants for the manufacture of man-made fibres.

* * *

Mr. D. S. M. Barrie, who is assistant secretary-general of the B.T.C., has succeeded the late Mr. T. S. Lascelles as president of the Railway Club. Mr. T. B. Sands has been appointed a vice-president.

* * *

Mr. J. D. Goddard and Mr. D. M. Stoddart have been appointed to the board of Stenor, Limited, Richmond, Surrey, a member of the Firth Cleveland Group. They will continue to be in charge of factor sales and home sales respectively.

* * *

Mr. John O. Sewell has been appointed general manager of the British materials handling division and the British lock and hardware division of the Yale and Towne Manufacturing Company. He succeeds the late Mr. H. Gilbert Ramsell in this post. Since June, 1958, Mr. Sewell has been assistant general manager and comptroller of the British divisions.

* * *

Publicity is being given the full-time sandwich courses which are attracting today about four times the number of technical college students that they did four years ago. About 3,750 young men and women are taking courses leading to the new diploma in technology which is equivalent to a university honours degree. Colleges are now planning post-graduate studies leading to the new M.C.T. (membership of the College of Technologists) at Ph.D. level

* * *

A course on contemporary economic problems in transport is included in the London University residential summer school at Wye College, near Ashford, Kent, on August 20-September 3. Fundamental economic concepts which affect inland transport by road and rail will be examined. Particular attention will be given to the problems of ensuring proper use of the nation's transport assets. The lecturers will be Messrs. G. A. Hughes, B.A., and J. A. B. Hibbs, M.Sc.(Econ.).

* * *

The Organisation for European Economic Co-operation is organising a technical mission of European experts to study petroleum distribution and transport facilities, techniques and equipment in France, the United Kingdom, Belgium, Germany and Italy, extending over a period of four weeks commencing on May 15. It is expected that 60 experts representing oil companies and oil equipment manufacturers will take part, and provision has been made for the nomination of 15 United Kingdom representatives.

* * *

The Minister of Aviation, Mr. Duncan Sandys, is visiting France and Germany. In the course of his visit to France, from Monday to Thursday this week, he was to meet the Minister of Defence, Monsieur Messmer, the Minister of Transport, Monsieur Buron, and the Air Minister, Monsieur Blancard. Among other matters, he renewed his discussions with the French Government on the possibilities of closer collaboration in the fields of aviation, guided weapons, and electronics. Mr. Sandys was also to see aircraft factories around Paris and at Toulouse, aeronautical research establishments and airport installations. He will be in Germany from April 21 to 25 to have talks in Bonn with the Minister of Defence, Herr Strauss, and the Minister of Transport, Herr Seebohm. He will also visit the airport at Frankfurt and the Hanover Trade Fair.

Sir Donald F. Anderson has joined the board of the British India Steam Navigation Co., Limited.

* * *

Mr. Arch Murphy, of Glasgow, has been appointed sales manager in Scandinavia for Trans-Canada Air Lines.

* * *

Alderman T. Lewis has retired from Southampton Harbour Board of which he first became a member in 1901. He became deputy chairman in 1944 and chairman in the following year. He held office as chairman until March, 1958.

* * *

Mr. R. L. Lickley, B.Sc., D.I.C., M.I.Mech.E., F.R.Ae.S., has resigned from the board of the Fairey Co, Limited, with effect from March 31, and has relinquished his appointments with the subsidiary companies of the Fairey group.

* * *

At the 1960 conference of the Institute of Traffic Administration, which is to be held in Nottingham on May 20-22, the principal business will be a discussion on the future pattern of traffic in Britain in which Professors Gilbert Walker and J. Kolbuszewski and Mr. F. D. Hobbs will take part. The two last-named gentlemen are of the traffic engineering department of Birmingham University.

* * *

Dr. R. Beeching, who is a member of the advisory group on the B.T.C. referred to in our last issue, has been technical director on the main board of Imperial Chemical Industries, Limited, for the past two years. He joined the company in 1948 with distinguished scientific qualifications after service with the Imperial College of Science and Technology, the Fuel Research Station and the Armament Design Department. In 1953 he went to Canada with special responsibility for the development of Terylene in that country and, before his appointment to the main board in 1957, served for two years as chairman of I.C.I. Metals Division.

* * *

Mr. G. E. Mash has been appointed manager of the dealer trade department of Petrofina (Great Britain), Limited.

* * *

Mr. A. E. Purnell has been appointed district operating superintendent, Wakefield, North Eastern Region, B.R.

* * *

Mr. A. H. Moncrieffe has been appointed assistant to commercial officer (passenger), North Eastern Region, B.R.

* * *

Mr. Tony Hole, for many years with Anthony Hoists, Limited, has joined the board of Autolifts and Engineering Co., Limited, in London.

* * *

The following Scottish Region staff appointments have been announced:

Mr. A. G. Webster, to be district traffic superintendent, Ayr.
Mr. A. D. R. Watson, to be district engineer, Inverness.
Mr. J. R. Beath, to be district goods manager, Glasgow.

* * *

Mr. B. G. Bonallack, M.C., T.D., M.A., deputy chairman of Bonallack and Sons, Limited, has been reappointed president of the National Federation of Vehicle Trades. Messrs. R. E. Sugden, director and general manager of Eastern Coach Works, Limited, and H. J. Bigg, director of Duple Motor Bodies, Limited, were reappointed vice-presidents.

* * *

Mr. M. G. Burrows, chief mechanical and electrical engineer, North Eastern Region, B.R., will in future control the road motor engineering work in the region and Mr. J. Don has been appointed road motor engineer in this department. Road motor engineering work was previously under the bi-regional control of the road motor engineer, Eastern and North Eastern Regions.

* * *

The National Committee on Road Transport Education announces the following prize awards:

Motor Transport and *Bus and Coach* prize (15 guineas) to Mr. L. W. Hazell (Hull); *Transport World* prizes to Messrs. H. Norman (Manchester) and L. Holdsworth (Slough); *The World's Carriers* prize to Mr. C. J. Goddard (Birmingham).

British Electric Traction prize (12 guineas) to Mr. H. W. Smith (Maidstone).

Scottish Road Passenger Transport Association prizes, for candidates in Scotland, to: Messrs. R. H. Watson and A. T. Sommerville (Edinburgh).

* * *

Last week the Lord Provost of Aberdeen, Mr. George Stephen, flagged away at 7.30 a.m. the first diesel-hauled high-speed express train from Aberdeen to Edinburgh. He was accompanied by Colonel D. H. Cameron of Lochiel, chairman of the Scottish Area Board of the British Transport Commission, Mr. James Ness, general manager of the Scottish Region, and Mr. J. H. Young, district traffic superintendent, Aberdeen. The ceremony heralded a cut in the journey time between Aberdeen and Edinburgh to three hours, as mentioned editorially, April 9.

* * *

The board of Thos. Cook and Son, Limited, has appointed Mr. Cecil Garstang to be general manager in succession to Mr. Charles Holt, who was appointed managing director in July last. In addition to his general management responsibilities Mr. Garstang will deal with the problems arising from the ever-increasing development of the Cook business at home and overseas, in conjunction with its associate, the Wagons-Lits Company. In particular he will be in control of future planning, having regard to the new travel potential throughout the world. He will deputise for Mr. Holt, who remains chief executive of the group, when Mr. Holt is overseas on tours of inspection.

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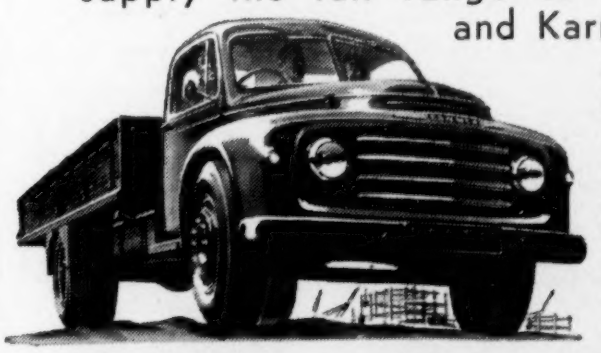

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IMPORTANT CONTRACTS

Home Demand for Guys

HOME market orders for buses and lorries to a total value of £360,000 were placed with Guy Motors, Limited, of Wolverhampton, during the week ending March 19. The whole Guy range, from the new Wulfrunian double-deck buses with air-suspension and disc-brakes to Invincible heavy-duty lorries, was covered by orders amounting to exactly 100 vehicles. The largest single orders were for the proven Arab Mk. IV buses—30 for Wolverhampton Corporation and 20 for Lancashire United Transport; the latter has also ordered three Wulfrunians.

Newcastle Favours Atlanteans

Newcastle upon Tyne Transport Committee has recommended the purchase of 25 Leyland Atlantean 78-seat double-deckers, as the first stage of its £2,500,000 vehicle replacement programme. The bodies would be built by Walter Alexander and Co. (Coachbuilders), Limited, Falkirk (13), and Metropolitan-Cammell-Weymann, Limited (12).

Grangemouth Petrochemical Plants

British Hydrocarbon Chemicals, Limited, announces that contracts have now been awarded for the construction of the three new petroleum chemicals plants at Grangemouth: the contracts for the methanol plant has been placed with Chemical Construction (G.B.), Limited, for the ethylene dichloride plant with the Lummus Co., Limited, and for the butadiene plant with Fluor Engineering and Construction Co., Limited.

Albions Ordered for Gas Haulage

Albion Motors, Limited, has received from Saturn Industrial Gases, Limited, an order for 24 Albion Chieftain 7-ton chassis, on which the operator is to build 18 ft. 6 in. long dropside bodies. They will be based at various depots and used to deliver cylinders of acetylene, argon, hydrogen, nitrogen, oxygen and propane to customers throughout Britain. Albion vehicles have also again been chosen by Vicicongo, whose Belgian Congo transport fleet is to be augmented by 12 Clydesdale chassis powered by Leyland O375 diesel engines.

Suction Dredger for Fleetwood

British Transport Docks has placed an order for the construction of a diesel-electric suction dredger for use in the dredging of the approach channel to Fleetwood Docks. The primary power units of the new dredger, which will be a twin-side pipe trailing hopper type, will be two Mirrlees JLSM8 diesel engines coupled to generators supplied by the Brush Electrical Engineering Co., Limited, which will also provide the control gear and the propulsion and pump motors. All dredging operations will be controlled entirely from the bridge. A Voith Schneider propeller will be fitted in the bow to assist in maintaining course when dredging. The vessel has been ordered from Simons-Lobnitz, Limited, Renfrew.

H.F. Link Equipment for Turkey

Turkish engineers are being trained at Marconi College, Chelmsford, to take over the operation and maintenance of h.f. radio telecommunications equipment being supplied to Turkey and Iran by Marconi's Wireless Telegraph Co., Limited. The equipment is being provided under a £225,000 order placed by H.M. Government as part of its programme of technical assistance to member countries of the Central Treaty Organisation. The contract calls for the supply and installation of independent sideband telephone and multichannel telegraph circuits between Istanbul, Ankara, Tehran and London. Installation by Marconi engineers is in hand and will be completed in a few months. Operational services will be commenced shortly after.

★

CHANNEL BRIDGE

(*Continued from page 3*)

each pier to form a support. The spans rest upon alternate fixed and expansion bearings on the pier caps.

The members of the truss spans of the superstructure are of circular tubular construction built up from steel plates by welding. The magnitude of the project and the large amount of repetition involved makes such a form of construction economic. The tubular form has outstanding advantages in efficient use of material and reduction of wind resistance and greatly simplifies the problems of maintenance. The dimensions of the tubes permit ample space for access and maintenance and for the accommodation of services, if required. The outside diameter proposed for the chord tubes is 11 ft. 9 in. and for the web members 6 ft. 6 in. The design of the bridge deck is based upon the orthotropic slab principle. The forms of the deck members are proportioned in such a manner as to induce deflection of the wind currents with a view to the protection of vehicles using the bridge. Wind-tunnel experiments are proceeding.

The design has been prepared with a view to the prefabrication of the pier ring segments and assembly of the superstructure units in work-yards to be established on both sides of the channel. This work would be carried out under the best conditions for mass-production, with all necessary handling facilities. The work-yards would be provided with effective connections to the adjacent road and rail systems and with launching facilities on the foreshore to protected basins. The pier ring segments would be floated out from work-yard basins to their permanent sites with the aid of buoyancy tanks or camels. At these sites they will be placed in position with the aid of "De Long" type pontoon platforms fitted with their own generating plant and all necessary hoisting, compressed air and maintenance equipment.

These platforms consist of large pontoons by which they can be floated from one site to another, with retractable legs or spuds which can be forced down to the sea-bed and by means of which the platforms can be raised from the water above the influence of wave action. The platforms will be serviced by vessels converted for the transport of all necessary materials for the construction of the piers. Complete spans of the bridge superstructure will be assembled in the work-yards, rolled out on slipways and transported on specially designed pontoons to the bridge site where they will be deposited by the falling tide upon the completed piers. The total weight of structural steelwork involved in the structure is approximately 800,000 tons. The cost has been put at some £200 million and it is understood that in its earlier deliberations, some years ago, the idea of a bridge was rejected on cost grounds by the study group.

SHIPPING and SHIPBUILDING

Carflow Decks for Vehicle Exports

EXPORT handling of motor cars will be speeded up by an invention of Fisher and Ludlow, Limited (material handling division), of Birmingham. It consists of tiers of open steel "hanging decks" which can be lowered in a ship's hold to carry 1,000 cars, and then quickly hoisted out of the way at the port of arrival to make room for a different return cargo. The whole series of false decks can be dismounted within one day by the ship's crew—even after the ship has put to sea again. At present, cars are generally carried on tubular steel scaffolding with timber stretched across it—an unwieldy system which takes five to eight days to dismantle after the cars have been unloaded. The new system therefore gives a quicker turnround of ships and lower demurrage charges.

K.P.M. to South Africa

THE Dutch K.P.M. line has decided to extend its line services in the African area at the beginning of May with a new service from Cape Town, other South African, Portuguese East African and East African ports, to the Persian Gulf. The service will be operated by the 4,000-ton passenger-cargo ship *Van Riebeeck*, built in 1949.

Initial Order for Cork Yard

WHAT is now known as the Verholme Cork Dockyard, Limited (the Irish associate company of the Dutch shipbuilding firm) has secured its first contract for a ship. A contract was signed in Dublin last week with Irish Shipping, Limited, for the construction of a ship of 15,000 tons deadweight for the cargo trade. The new vessel will be a sister ship of one recently ordered by Irish Shipping from a West Hartlepool yard.

Clyde Liner Berths Shelved

THE Clyde Navigation Trust has endorsed a recommendation of its general purposes committee not to proceed at present with a proposal to provide in the Glasgow area a passenger liner terminal and deep berths for the largest cargo ships. A month ago Mr. Andrew Hood, a former Lord Provost of Glasgow, suggested that tourist traffic would be encouraged by a liner terminal in the Glasgow area. The trust takes the view that present facilities are enough for trade requirements.

35,000-Ton Motor Tankers

THE BP Tanker Co., Limited, has now decided to install diesel machinery in its 35,000 tons deadweight tanker, building at Hawthorn Leslie-Hebburn, and due for completion early in 1962. In addition the ship will be rearranged to have all superstructure, including the navigating position, abaft the cargo tank space. The engine selected is the latest Sulzer design of single-acting two-stroke cycle turbo-charged 8 R.D. 90 type developing 16,000 b.h.p. maximum, 14,000 b.h.p. service rating.

Fantastic Pilferage and Damage Bill

A SUM of over £431,500 has been paid by marine insurance companies on damage and pilferage claims in respect of cargo landed in the port of Colombo from the time it was nationalised on August 1, 1958, to July 31, 1959. The Marine Insurance Companies' Association has consequently threatened the Colombo Port Cargo Corporation with either an increase of insurance rates or a total refusal of insurance cover on cargo shipped to Colombo, if no immediate improvement is effected.

Teak Planking on Aluminium Decks

RECENT developments in the use of aluminium for large superstructures, such as that in *Oriana*, have brought several new problems, including the securing of deck planking to aluminium decks. In her, the laying of teak decks has been the subject of considerable research. On this vessel a hard latex underlay is applied to the aluminium decks, to give a perfect base for the wood decking. A group of planks is set-up and wedged in an exact straight line, each group comprising five strakes (or planks) wide and extending over the full length of deck being sheathed. The position of each securing stud is marked on the planks and drilled to give a $\frac{3}{8}$-in. diameter hole in the planks and the underlay, and a surface skim on the aluminium deck. Each plank is referenced and lifted, and the latex round each stud position removed prior to the welding of the stud. The underside of the wood planking and the surface of the latex are coated with Maxoid and the planks replaced and secured by a washer and nut on each stud. The stud holes in the deck planking are dowelled and the deck is caulked with boat cotton and payed with marine glue. Any excess of glue is removed and the deck is sanded to give a good quality finish. The new technique has been developed by Vickers-Armstrongs (Shipbuilders), Limited, which is building this liner at Barrow.

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FINANCIAL RESULTS

NOTES on the trading results, dividends and financial provisions of companies associated with the transport industry are contained in this feature, together with details of share issues, acquisitions and company formations or reorganisations.

Seddon Diesel Vehicles

Seddon Diesel Vehicles, Limited, is resuming interim payments with a 5 per cent declaration for the year ended June 30, 1960. Trading conditions and profits for the first nine months of the current year show a marked improvement, it is stated, and subject to this improvement being maintained, "a final dividend of 10 per cent would be justified." This would mean a 15 per cent total, against the previous year's 5 per cent.

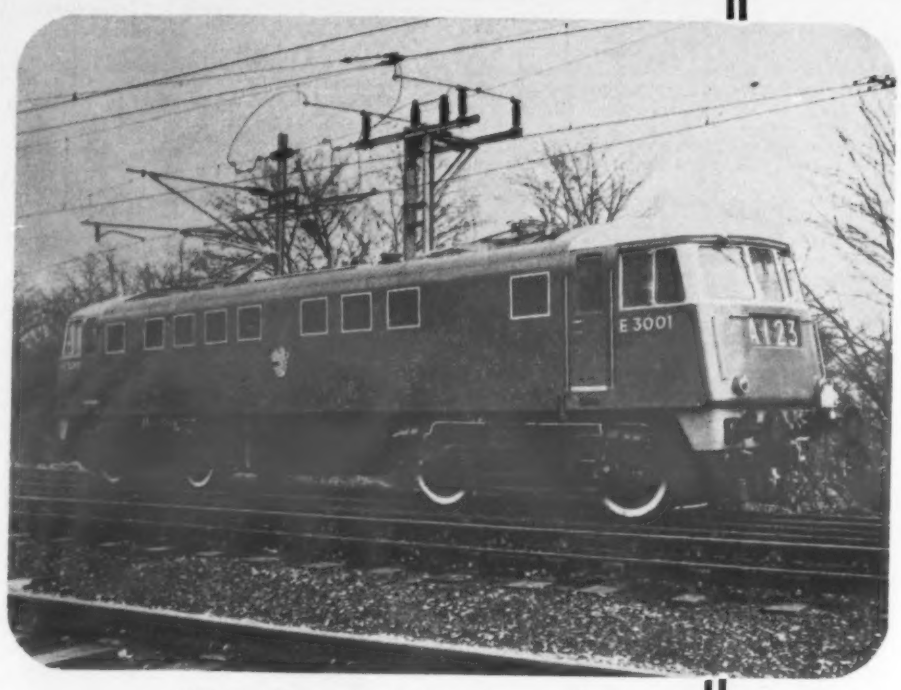
Thomas Harrington

The board of Thomas Harrington, Limited, has now announced that it has received an offer from Robins and Day, Limited, Guildford, to acquire all the issued ordinary shares of the company. The offer has been accepted by the holders of over 93 per cent of the ordinary shares and has become unconditional. Robins and Day is a holding company with interests in the motor industry. Rootes Motors, Limited, has a minority holding in the company.

Vauxhall Motors

Sales turnover of Vauxhall Motors, Limited, in 1959, at £130 million, was up by 37 per cent over the previous year. Profits before taxation were £13¼ million (£1,120,000) and net profit £6,428,000 (£756,000). Total sales, of 244,655 units, were up by 40 per cent over 1958. Exports, of 134,912 vehicles, worth £64 million, increased by 30 per cent. Both these were new records for the company. Dividend (the first since 1955) is 25 per cent. The improvement in results is attributed mainly to higher output made possible through the fuller utilisation of the expanded manufacturing facilities. Provision for income and profits taxes for the year amounted to £7,054,000.

The first A.C. Electric Locomotive for British Railways



British Railways type "A" 3,300 h.p. 25kV 50 cycle a.c. electric locomotive, one of 23 being supplied by Associated Electrical Industries Ltd., for service on the London Midland Region.
(photo by courtesy of British Railways)

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APPLICATIONS are invited for appointment from October 1, 1960, or as soon as possible thereafter, to a Rees Jeffreys Research Fellowship in Transport. The Fellow appointed will be required to pursue with a view to publication research within the field of the Fellowship, which is defined as the economics, administration, organisation and regulation of transport (which includes air and sea transport as well as inland transport). Salary within the range £2,000—£2,950 a year, with superannuation benefits and family allowances; tenure for three years in the first instance, but with the possibility of renewal for maximum of seven years in all. Provision has been made for necessary travel expenses of the Research Fellow and for research assistance.
Further particulars should be obtained from the Secretary, London School of Economics and Political Science, Houghton Street, London, W.C.2, by whom applications should be received not later than May 14, 1960.

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